CHEMICAL & METALLURGICAL ENGINEERING

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CHEMICAL & METALLURGICAL ENGINEERING

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Consulting Engineers Can Serve Manufacturers

OBSERVATION extending over a number of years leads to the belief that manufacturers and consulting engineers are overlooking, or at least not making the most of, an opportunity for mutual service and profit. A leaf from editorial experience will illustrate the point. An editor never returns from a field trip without having seen or heard of a new mechanical device, a novel use in one industry of equipment that has long been standard in another, new products or byproducts, potential markets for raw materials and finished products, or unexpected applications of well-known principles. As far as practicable the information and data thus obtained are passed on to the reader and in some cases by personal communication to the manufacturer; but there is much that cannot be published, although it is willingly revealed to the man who will personally go after it.

Repeated experiences of this kind suggest several things. First, personal contact with the field yields information that is obtainable in no other way. Second, manufacturers are usually so preoccupied with problems of production and distribution that they have neither the time nor the personnel to devote to a survey that will discover new markets, new methods, competing appliances or the development of new industries. Third, the consulting engineer, properly selected for his training and experience, is qualified to undertake a technical survey of this kind as a temporary engagement, furnishing his client with a comprehensive report.

The suggestion is not wholly speculative or academic. An equipment maker who contemplated the manufacture of a new machine for sizing granular material engaged a consulting engineer to make a personal investigation of all the industries in which screening and sizing were important operations. The subsequent report set forth the extent of the field, the requirements of different industries, the efficiency and suitability of existing methods of sizing and much more pertinent information. It is safe to say that on the completion of the survey the manufacturer knew more about the operations of screening and sizing in industry than any other individual and had a safe basis for his ultimate decision. Still another manufacturer has steadily extended his field of operations into new industries by just such investigations by qualified experts.

The idea is susceptible of a great variety of applications, determined by the individual problem. Perhaps a manufacturer is interested in the potentiality of a great territory, like the rapidly developing Pacific coast region. Perhaps it is a new industry that has sprung up and which may or may not be permanent. Perhaps it is a need for cheaper raw materials. Whatever the problem, it seems to us to offer an excellent opportunity for closer co-operation between the manufacturer and consulting engineer.

The Value of Theory As a Guide to Practice

OCCASIONALLY we hear of groups of individuals, usually with marked religious tendencies, who still maintain that the world is flat! Science always finds it difficult to convince those who want to persist in a belief the foundation of which has been demonstrated to be illogical and contrary to ascertained fact. In this class may be included a coterie of metallurgists who decline to acknowledge that advances have been made in the science of physicochemistry. Ten years or so ago a series of misinterpreted experiments led to the conclusion that the so-called precipitation of gold in aurocyanide solution by charcoal was due to occluded carbon monoxide gas. The verdict found wide acceptance, supporters of the theory differing only as to the precise character of the chemical compound formed.

In opposition to this contention a mass of evidence was adduced by an independent investigator to show that the "precipitation" had all the characteristics of an adsorption—a view that forecast more extensive research in an effort to benefit from the wealth of knowledge available in the field of industrial colloid chemistry. Every argument—and many were advanced—clinched the fact that carbon monoxide had nothing to do with the result obtained; and that the reaction could not be expressed in terms of a chemical equation, any more than could the abstraction of dye by cotton or picric acid by platinum black. Confirmatory research by others served to substantiate the new viewpoint; and it is doubtful if any thinking chemist now believes that a gas plays any significant part in the reaction, or that carbon acts differently with aurocyanide than it does with any other adsorbable metallic solution. Yet a reiteration of faith in the chemical-compound theory comes at intervals, in harmony with the belief that the earth is flat. In a recent bulletin of the Institution of Mining and Metallurgy, G. C. Klug, an experienced metallurgist and sometime president of the Australasian Institute of Mining and Metallurgy, goes out of his way, as it were, to voice agreement with the discarded contention that the abstractive effect of charcoal on a precious-metal solution is due to a chemical action involving the precipitation of a double compound.

To many, theory is merely academic; but in the present instance there is ample proof that sound theory is leading to a promise of efficient and economical practice. If a gold compound is precipitated by the gas-laden char, then the end of the trail has been reached. If it is an instance of adsorption, an avenue of research is suggested in an effort to increase the activity of the char, or to effect a selective abstraction of one of the two precious metals found in plant cyanide solutions. The value of a structure is dependent on the stability of its foundation. A disregard of the verdict of scientific research is usually a preliminary to technical and economic failure.

Detinned Scrap—A Byproduct Of a Byproduct Industry

WHEN Science is applied to Industry it is difficult to forecast a limitation as to the ultimate outcome in the general increase of efficiency. Like the result of throwing a pebble into a stagnant pond, the effect of research may spread in all directions; although misdirected aim may merely result in a disturbance of the mud at the water's edge. These cogitations were inspired by a specific and unusually interesting example of the unexpected effect of the application of intensive chemical research and engineering acumen, in which the name of Em. Kardos is prominently associated, whereby the byproduct of the chemico-electrolytic process he has devised for the extraction and recovery of tin from scrap is now being utilized with success in the recovery of copper from leach solutions.

Readers are familiar with one phase of the hydrometallurgy of copper in which broken ore, "in place" underground, is leached and the copper precipitated with iron—a metal that also serves for recovering the copper in mine water and in the effluent of leached dumps of low-grade ore on the surface. It also plays an important part in one step of sundry chemical processes for the recovery of copper by the electrolytic process, as practiced at Ajo, Ariz., and Chuquicamata, Chile, for example. The use of scrap iron of almost any character has been recommended as a precipitant mainly because of cheapness and availability, although considerable expense is often involved in the reduction of the pieces to a size suitable for handling. Only a few years ago a type of precipitation apparatus was devised whereby many improvements were effected in the practical application of the idea, one of which made it possible to use large pieces of scrap iron. On the other hand, an unwelcome factor of variation in the character of the precipitant was introduced.

The detinning of scrap from container factories, a byproduct of the canning industries as it were, suggested the recovery of the steel as well as of the tin. Prior to the application of research to this problem the tin scrap, almost valueless, could be utilized only in sash-weight foundries. After separating the metals of which it is composed, however, two sources of income became available. The steel, after passing through the stripping process, is free of foreign matter; and, having a large surface in comparison with weight, it was found especially acceptable as a precipitant of copper from leach solutions. With a confidence in uniformity and physical character, trials were made that proved successful; and it is interesting to note that about 1,000,000 lb. copper per month is now being obtained by one company alone from the precipitation of leach solution that is allowed to percolate through the immense masses of caved ore in the Ohio Copper mine. The detinned scrap, used exclusively as a precipitant, is shipped from the Metal & Thermit Corporation's plant at South San Francisco, Calif. With ordinary scrap iron the extraction of copper from the leach solution averaged only 65 per cent during passage through 1,100 ft. of launder, the resultant precipitate containing 75 per cent copper. When a change was made to detinned scrap, an extraction of 80 per cent was obtained by the utilization of only 200 ft. of launder.

A significant feature of result is that, despite the lowness in grade of the solution and the need for the practice of strict economy in operating expense, the cement copper resulting now averages 90 per cent pure, the total cost of production for 1924 being about 5¾c. per pound. Thus it is seen that Science finds a way to utilize a byproduct of a byproduct industry, and to produce results so excellent that attention is once again deflected to the almost unlimited opportunity for research.

Chemico-Electrical Methods Are Replacing Smelting in Metal Recovery

WITHIN the comparatively brief space of a quarter of a century or so, metallurgical practice in general has undergone a profound change; and the achievements and possibilities of chemical beneficiation of ore by wet methods, followed in most instances by electrolytic recovery of metal, hold the center of the stage. Hydrometallurgy in recent years has forged ahead to a position of dominant influence in technology and economics. The rise of the cyanide process was spectacular: its introduction resulted in a doubling of the world's output of gold within a decade. The solution treatment of silver ores followed, displacing almost entirely the inefficient amalgamation processes then in vogue. Recent physicochemical achievement in the use of an inert adsorbent, activated char—in place of a metallic and solution-fouling precipitant—emphasizes the trend of the times. Waste is being minimized in an effort to reduce operating costs; and it is interesting to note that a chemical process for the recovery of solvent in spent solution is being widely adopted. Copper metallurgists were quick to adapt and improve the technique of bulk leaching, developed in the early days of the cyanide process; and the world now owes much of its supply of copper to this method. More recently, smelting has received another setback in favor of chemical wet treatment, which has been developed to such an extent that sulphide as well as oxide ores of certain types, available in immense quantities, can be treated at low cost and high recovery percentage. All the significant economies introduced in recent years have been due to the utilization of basic chemical reactions and the adaptation of chemical engineering equipment. Acid and ammonia leaching, respectively, have made possible the production of copper in immense amounts at a cost of a few cents per pound, thereby contributing in no small measure to the wider application of electrical energy and the utilization of latent power. Ferric sulphate, with or without acid, promises to be an efficient solvent, thanks to intensive research and tireless experimentation. In each process, electrolysis leads to a refined metal, which smelting can never hope to produce on an economic scale.

Among the base metals, lead claims increasing interest as a promising field for hydrometallurgical development, with a background of fine technical achievement in 1924, particularly in regard to the production of electrolytic metal. The problem of treating complex ores is a step nearer solution in consequence of the persistent research of several metallurgists, who have realized the broad possibilities of wet chemical methods in the extraction and separation of base metals. Electrolytic iron is a reality, in which active interest is being evinced on both sides of the U. S.-Canadian border. Wet chemical methods are used for the recovery of tin from scrap, vanadium from mine water and ore; and there is promise that research will point a way to the ultimate recovery of aluminum from clay.

Preventing the Spread of Systematized Misrepresentation

THE announcement that the American Association for the Advancement of Science is to take the defensive in a fight against the "apostles of systematized ignorance," in an effort to stem the tide of official suppression of certain phases of scientific education, is most welcome. The time is ripe for an organized movement that will prevent zealots from instituting further restrictions against the spread of revealed truth—against scientific revelation, or organized common sense. Otherwise the time will come when biological research and artificial biological selection will cease; and doubt will be cast on the sincerity and claims of those who have been responsible for recent discoveries in radioactivity and transmutation, which is merely one phase of natural evolution.

Many thinking citizens would be glad of an opportunity to become associated with an energetic movement in favor of combating the insidious propaganda of those who appear deliberately to misunderstand the impartial nature of true scientific discovery and its inevitable verity. Recently we heard of an organization, the Science League of America, formed for the ostensible purpose of opposing the influence of W. J. Bryan and his "fundamentalistic" associates. The motive was a worthy one; but the identity of the leading officials was the subject of constant inquiry, and the operation of the league from a post office box in San Francisco did not inspire confidence. The movement now launched by the American Association will, we feel sure, be widely supported. Vigorous action alone will prevent the repetition of the ousting of university professors because of their adherence to the results of unbiased and impartial scientific investigation.

Chemistry in the Building Trades

EVER since the building trades began to emerge from the stage of empirical arts, chemistry has had a share in the improvement of result, although this was usually achieved by crude, hit-or-miss experimentation, rather than by scientific investigation. As an example of the scope for chemical inventiveness, it is interesting to review progress in the manufacture and utilization of stucco, or plaster of paris, so called because of the original locality of exploitation. Crude chemical research suggested the dehydration of gypsum and its subsequent pulverization to form a white cement. Alum, well known as a styptic, was early used to insure delayed setting and to produce a harder plaster. The bulk of recent development in the gypsum industry, however, has been in connection with the introduction of refinements in the mechanical phases of processing. In addition to its recognized applications, the finished product has found wide application as a light tile for interior partition work.

The scope of the chemist seemed at an end. Architects were accustomed to specify concrete for insulation and fireproofing, especially below floors and on roofs; but the weight of this proved a serious addition to large steel-structure buildings. Extreme strength was not required; the primary advantage of concrete was not utilized. Plaster of paris is much lighter and easily cast, but it is not cheap. The finished product weighs about 78 lb. per cubic foot; mixed with sawdust it weighs about 55 lb. per cubic foot.

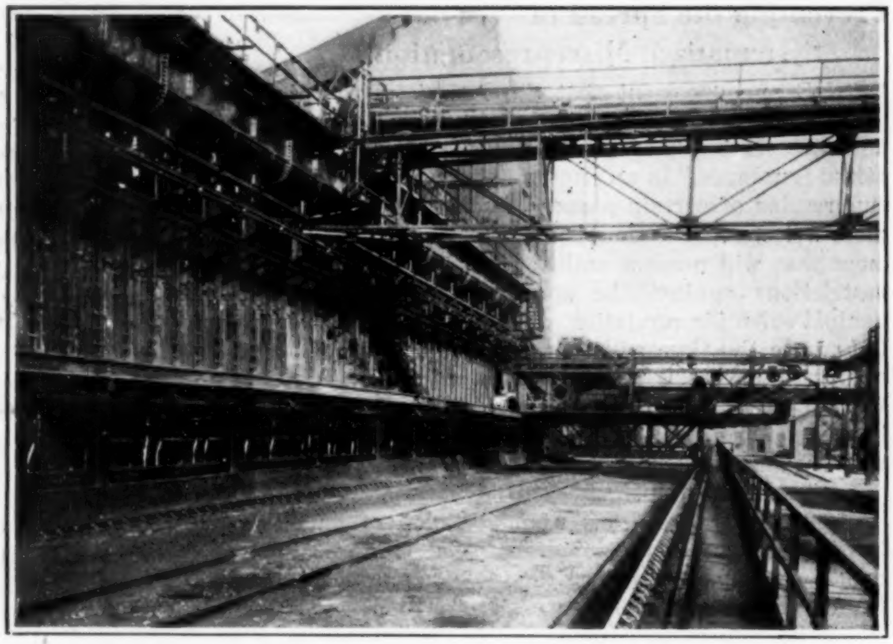
Air has always been recognized as one of the best insulators and the cheapest of adulterants, but the even aëration of plaster of paris was found to be impracticable. The chemist, however, solved the problem. He incorporated with the calcined gypsum a small amount of aluminum sulphate and calcium carbonate. When mixed with water a carbon dioxide effervescence occurs, with the result that the mass sets in honeycomb form. The cast Insulex, as it is termed, weighs about 24 lb. per cubic foot, as compared with 108 lb. for cinder concrete and 144 lb. for rock concrete. It may be surfaced with concrete or wood or roofing material. It may be cast in any desired shape for use as an insulator, for steam-pipe covering, for example. The successful application of simple chemistry to these phases of building operations makes one wonder how many other problems in the same industry are awaiting solution by the chemical engineer.

Postage Rates and Postal Salaries

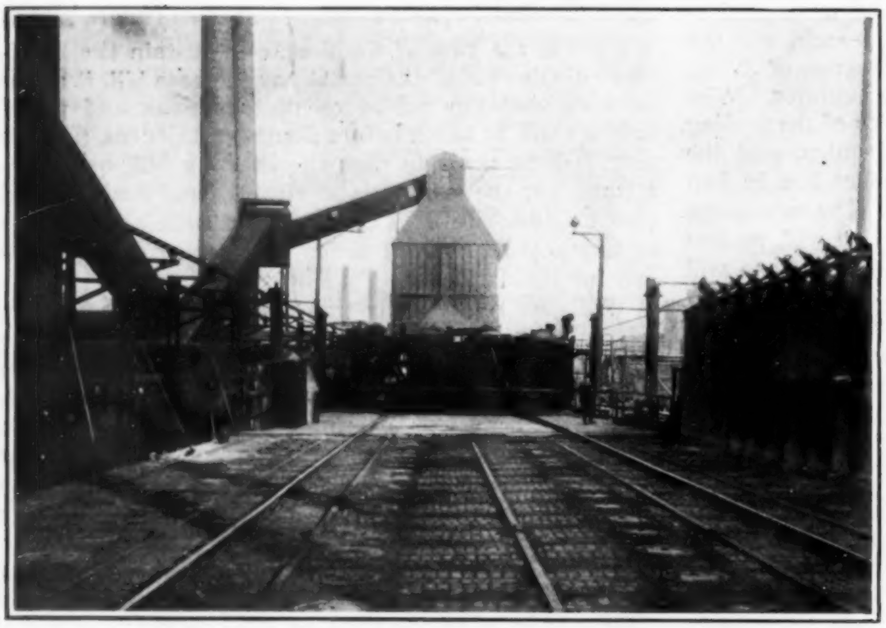
WITH the vote of the Senate to sustain the President's veto of the postal pay increase bill, it seems unlikely that any action on postage rates and postal salaries will be taken before Congress adjourns. Efforts may still be made to pass the Sterling bill, or a substitute, but the subject is so complex and controversial that it is doubtful if it can command sufficient harmony of thought and unity of action in the short time remaining for legislation.

While we realize fully that opposition to an increase of postal salaries is unpopular and that magazines entered as second-class matter are open to the charge of bias and self-interest in voicing such opposition, nevertheless we feel that the President acted wisely in vetoing the Sterling bill and that the Senate properly sustained him. In the first place, the bill added millions to the expense of the government without providing additional revenue, a proposal quite inconsistent with the plan of the national budget and out of harmony with the policy of economy. Second, it was originally passed in spite of the fact that the Postmaster-General would shortly lay before Congress the results of a thorough investigation into the cost of postal service which would form the basis for intelligent legislation. Third, it proposed a blanket increase without taking into account the economic conditions in rural communities, small and large cities, both as to cost of living and available supply of postal employees at existing salaries. In short, the bill had all the earmarks of a political and not an economic measure.

The delay now afforded by the President's veto and the action of the Senate gives opportunity for study of the whole subject, rates and salaries, so that any legislation that may hereafter be enacted will take into consideration the cost of handling mail—first class, second class, parcel post, franked mail, rural free delivery and other services. If a sincere effort is made to blaze a new trail based on facts and figures, some present abuses and privileges will be wiped out and revenue provided for adequate salaries without throwing an unfair burden on second-class mail matter. The latter has been the target of all legislative attack in all recent rate increases.



(AT RIGHT) — View along pusher side of the three batteries of 55 ovens each. The total carbonizing capacity of the plant is 3,500 tons of coal per day.

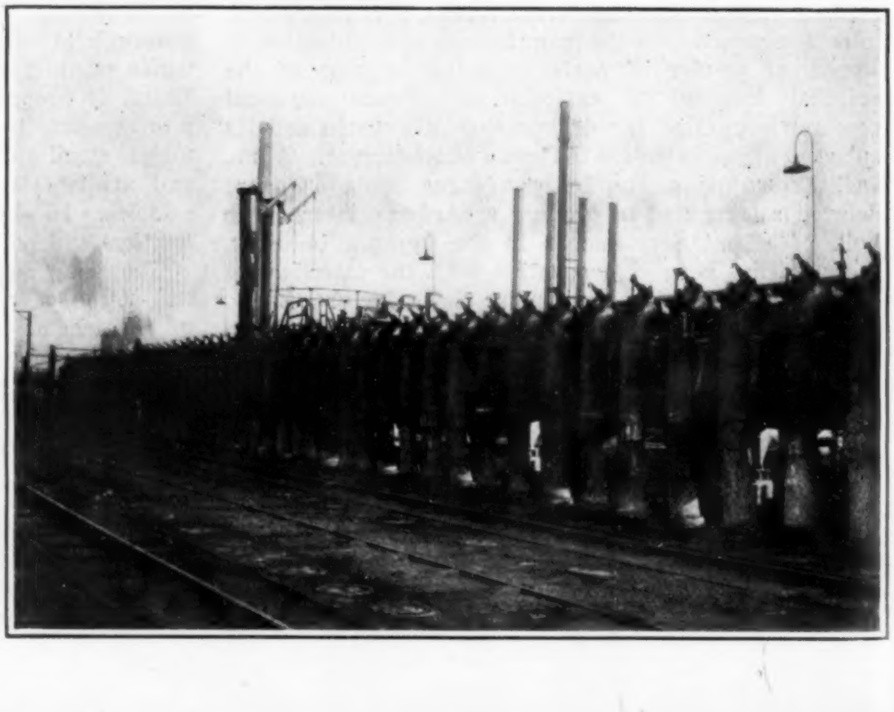


(CENTER)—Top of the ovens showing the 1,800-ton coal bin and the charging larry of 12.5 tons capacity.

Coke Ovens for

THE BYPRODUCT coke-oven plant, because of the value of its byproducts and the high heat content of its gas when compared with other types of plant, is becoming rapidly more popular as a source of city gas supply. One such plant is the Seaboard Byproducts Coke Co., Kearny, N. J., pictured here, which supplies gas to the large nearby cities.

At this plant, which has a carbonizing capacity of 3,500 tons daily, low-ash coals are blended to make the charge, and operation is controlled so that the ovens produce a high-grade coke, particularly adapted to domestic use, although metallurgical coke can be made at will. The heating, which



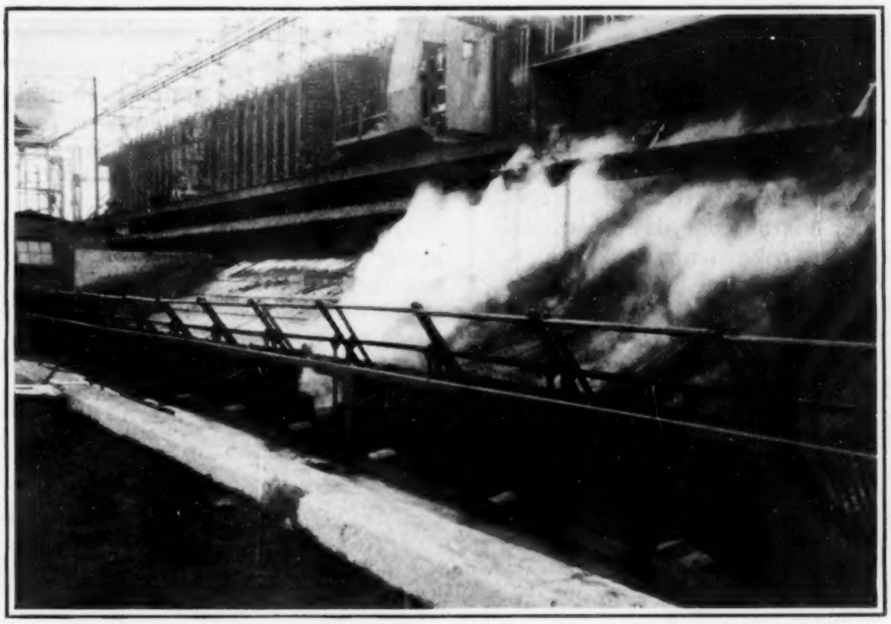
(AT RIGHT)—Gas off-takes on one battery, through which the hot tar-laden gases pass into the collecting mains shown in the upper view.

(AT LEFT)—Coke side of ovens, showing coal crushing and mixing building on left and producer gas mains that supply approximately half the fuel used in carbonizing.

Making City Gas

can be with either producer gas or surplus oven gas, is at present about evenly divided between each. A blue gas plant is lined up in the system to cover the demand peaks of the gas load. The plant has been designed with great flexibility for meeting widely varying coal and coke markets while steadily supplying the distributing company with a definitely contracted-for amount of gas.

Like most modern byproduct coke-oven plants, this plant exhibits a cleanliness, neatness and order unfortunately lacking in many other industries. As an example of how to achieve economy through care, we can heartily recommend a close study of coking plant operating methods.



(CENTER)—A close-up of the quenching car at moment of unloading the coke into wharf from which the coke is carried to the screening and loading stations on belt conveyors.

(AT LEFT)—The beginning and end of the process. In the foreground is shown a barge coke loader, in the distance the coal unloader.

Starting a Byproduct Coke Plant in Central Siberia

Dramatic Account of the Successful Attempt by an American Organization to Place in Operation a Plant Started Early in the War and Practically Neglected Since the Revolution

By N. I. Kishor and **H. Kweit**
Formerly Shift Superintendent — Formerly in Charge of Laboratory
Kemerovo Byproduct Coking Plant

ALTHOUGH Siberia is now widely known as a tremendous reservoir of natural resources, it is generally believed that practically nothing has yet been done toward its development. The fact that development has already gone as far as the construction and operation of such a keystone of industry as a byproduct coke plant will most likely come as a surprise even to those well informed on world industry.

> Two thousand miles and more from sources of even the simplest equipment, winters seven months long with temperatures from 5 to 40 below zero, a half-completed plant that had stood for several years almost without attention, untrained labor—this was the discouraging situation facing the American organization that attempted to put into operation the Kemerovo Byproduct Coking Plant. The struggle and its successful outcome as described by the authors forms an industrial drama of absorbing interest.

To the best of our knowledge, the Kemerovo Byproduct Coking Plant is unique in the world from the point of view of the climatic rigors with which it has to contend. Carrying on the everyday operation of a coke plant through a 7-months-long winter when days of comparatively mild weather (5 to 10 below) alternate with days of 20, 30 and 40 below zero; when after a month of respite summer takes the mercury up between 90 and 100 and keeps it in that neighborhood for the next 3 months, with the pumping station strained to the full to supply cooling water from the rapidly diminishing river—under these conditions operation becomes a problem of a type that is hardly to be encountered anywhere else in the world.

Another unusual difficulty that presented itself at Kemerovo was the great lack of skilled workers and the appalling ignorance of the unskilled. The well-trained Russian worker can hold his own with any, but of these there were very few and the majority of the plant force was composed of untrained Russian and Siberian workers and Siberian peasants. The greatest difficulty was experienced in making some of these men, who had never before seen an industry in their lives, understand the simplest mechanical operations, or even the idea of danger to themselves from the machines and electricity.

The plant has already had a long and eventful history. Eight years from commencement of construction to commencement of operations! The concession for the mines and coke plant was originally granted to a French and Belgian corporation by the Czar's government as part of the war program. Austrian war prisoners were shipped out and the work was started with a rush. Despite the natural difficulties, a great deal had been accomplished by the time of the revolution in 1917, but from that time on work slackened, materials failed to arrive, food supplies got scarcer and matters went from bad to worse. The atmosphere was emphatically not one of construction. At some period during the frequent changes of government that the region underwent, the Belgian engineers departed, taking most of the plans. During the next few years chief engineers came and went. Each made new plans, made alterations, waited for supplies and money and finally went, leaving his total additions to the plant mostly in the form of blueprints.

Nevertheless, construction work on the ovens and the buildings had been pushed along somehow, and the boilermakers had accomplished most of their work, although they possessed not a single automatic tool and everything had to be done by hand.

The survey made by the Americans on taking over, under the necessity of going into operation at the earliest possible moment, gave a picture that was not very inspiring. During the years of lax management the doors of the buildings had broken off their hinges or had been taken away for use in houses, and in general no attempt had been made to protect the equipment against the snow that drifted in during the winter and melted and dripped away in the spring. In many places the concrete was cracked, and the buildings and equipment, covered with bird droppings from the pigeons that clustered and flew back and forth near the roof, suggested now decay, now sadly unharnessed potentiality. The concrete tar and ammonia liquor tanks, both of which were underground, contained more than 2 ft. of water that was at first thought to be seepage. The pipe tunnel was full of water. The concrete storage tanks for the crude benzol were full of water. The milk of lime tank was full of water and contained a drowned goat—fortunately recent. Some unidentified genius in the succession between the Belgians and Americans had constructed two sizable concrete pitch bays below ground level and 8 ft. deep! How he had intended to get the pitch out of those bays must remain forever a mystery. The pipe lines were a sad sight. In many places flanges had been bolted together simply without gaskets, and the lines were full of sags and bends. For lack of others, cast-iron tees had been put in on the high-pressure steam line. The laboratory

equipment consisted mainly of two sinks, a doubtful-looking balance, a large number of condensers and an immense assortment of pipettes ranging from 1 to 500 c.c.

As for the ovens, a letter was found in the files from the Belgian chief engineer to his firm in which he stated that owing to the difficulty of controlling the work he would not be answerable for the functioning of the ovens. The bricklaying work, he claimed, had been done so sloppily that it was useless to expect the oven walls to be gastight. About this nothing could be done but to hope for the best. There was another point, however, that promised trouble. The pipette is a vertical-flued oven, every second flue being open to the top for inspection of the flame. The gas enters the flue through a narrow slit in the bottom brick. The chief engineer ordered the bottom row of bricks knocked out from the wall of every oven so as to disclose the gas entry slits, and sure enough, more than half of the slits were completely choked up with dust and dirt and things that had simply been dropped into the flues.

Work on the byproduct plant was practically at a standstill, owing chiefly to the complete absence of pipes, valves and fittings. Advantage had been taken of the low-priced and comparatively contiguous German market, and a member of the American staff was already in Germany buying these supplies, as well as the other laboratory materials needed to supplement the pipettes.

With the arrival of the purchases from Germany matters began to get really under way. Pipe lines were trued out or completely relaid. The heating system, without which winter work would be absolutely impossible, emerged from the stage of discussion and was installed. In the coal-crushing plant it was found that not a single unit had been set true, and each one had to be lined up anew with the driving shaft. The testing of the machines (except for the exhausters) had to wait for the completion of the central power plant (a 1,000-kw. three-phase General Electric turbo-generator), as the only other source of power was a small d.c. machine.

There being no market for ammonium sulphate, it was decided not to strip ammonia and to use the only two scrubbers that were ready for benzol stripping. But as there was no creosote or other suitable wash-oil to be obtained, this also had to be deferred until there should be creosote from the plant's own tar distillation.

In December the heating of the ovens was begun. In the absence of gas, wood and coke were used as fuel. Fully 2 months was taken to bring the battery up to temperature. At the last moment the water supply failed. The pumps brought up nothing. A gang of men was sent out with furnaces onto the frozen river to thaw through the ice and clean out the intake channel to the pumps. Meanwhile advantage had to be taken of the mild spell of weather and orders were given to charge the ovens. The job of starting up a new battery of ovens with absolutely untrained workers is a rare and nerve-racking experience. Fortunately there were no accidents, except for one man who, wishing to put away the iron hook he was holding, calmly reached up and hung it on the 550-v. trolley line. Till then our frequent warnings about the wires had not made much impression.

Tar in Gas Causes Shut-Down

At first it seemed that everything was going well. The pumps brought sufficient water again. But there had been no opportunity to discover beforehand by laboratory investigation that the mixture of coals that was being used for the coking would produce such an extraordinarily thin tar. The ovens (which were of the waste heat type) burned their own gas. Despite all remedial measures that could be adopted on the spur of the moment, the gas left the byproduct plant with considerable tar, which deposited in the gas burners and clogged them up. The men who were set to cleaning them were fighting a losing game. With half of the flues at any given time not burning, the coking was, of course, far from complete, and even many hours after the oven was due to be pushed a mass of uncoked and semi-coked coal extended from the heads far into the oven at each end. Of course against this the pusher could not operate, continually pushing itself off the rails instead. Meanwhile the weather got colder. There was nothing to do except to shut down and recommence heating the ovens.

Consternation ensued throughout the village. The Americans had tried to start the plant and had failed! Wiseacres had the time of their life expounding the "real reasons." But their opportunity lasted only a few days. The scrubbers were charged with mazut, and the ovens were loaded again. This time success was complete. The gas, sent through the scrubbers, returned quite free from tar, and from now on a hard

A Climate Loaded for Bear

This is our idea of real steppe country. However, it would be much easier operating if a monkey wrench could be bought at a corner hardware store instead of sending across a continent for it.

and good coke was continually pushed out onto the coke platform. In a few days the coal was cleaned out of the boiler house and the burned gas passed under the boilers, and the workers all came to see the sight of the big Babcock & Wilcox boilers holding steadily on 14 atmospheres without receiving a scrap of coal and hardly any attention.

Debenzolizing Begun With Tar

To defer benzol production until there should be on hand a sufficient quantity of creosote would have been too great a loss, and it was decided to employ the well-known "C" process used in England during the war (washing out the benzol by means of tar). There was not enough tar, however, to work this process if it were to be sent to the distillation plant after going through the scrubbers; the tar was consequently sent through the benzol plant, debenzolized and returned to the scrubbers just as though it had been wash-oil, except for the fact that fresh tar had to be added at more frequent intervals. Of course, the amount of benzol was not as great as would have been obtained with wash-oil, but 2 months production was gained.

The tar distillation was started soon after the benzol stripping. The plant consists of two 23-ton gas-fired pot stills. The tar is remarkably free from water, the whole distillation proceeding quite quietly; priming has never yet occurred, although the dehydrators have never yet been used. With the starting of the benzol rectification, the first byproduct coking plant in Siberia was in complete operation.

The Kemerovo coke has already gained considerable popularity throughout the Russian market as a low-sulphur coke. The sulphur is never above 0.6 per cent, whereas Donetz Basin coke is about 1.0 to 1.5 per cent, and although the entire available output has been contracted for by the Ural Metallurgical Trust, special orders for low-sulphur coke come in from all parts of Russia and are filled whenever possible.

The difficulties of production at Kemerovo have not yet all been solved, however. The ideal of a clean coke of unvarying quality has not yet been attained. Kemerovo coal has a volatile content of about 28 per cent. For coking it must be mixed with the coal from the Kolchugino mine (about 60 miles away) which has 35 per cent volatile. Neither mine has an output of constant quality, and the coking operation is often considerably disturbed by the variations in one or both of the coals. In the Kemerovo veins particularly, zones of extremely high ash are occasionally encountered. It is the Kemerovo coal that is mostly to blame for the high ash content of the coke, which runs about 13 per cent. To understand the difficulty of installing any system of coal washing, it must be borne in mind that for more than 6 months of the year the temperature is below freezing, and the Kemerovo coal has to come about a mile and a half by aërial bucketway from the mine shaft and across the river to the plant. Coal washing at the plant would involve extensive alterations.

Further handicaps are inherent in the installation, many features of which must have been already old-fashioned even at the time when the plant was projected. The ovens are 22 in. wide and it has as yet been found impossible to reduce the coking period to less than 30 hours. Certainly such wide ovens are not suited to the local coal. Furthermore, the crushers, which are not adjustable, grind the coal far too fine, giving a powder of 30 mesh. There is no gas holder —not even a small one. The scrubbers and much of the other byproduct equipment are of old-fashioned and not very efficient types. But what must be practically inconceivable to men who have worked all their lives in American industry is the fact that practically every little thing from a wrench up has to be ordered and bought from 2,000 to 9,000 miles away.

As rapidly as possible the equipment is being modernized. A quenching and loading car has been bought from Koppers of Essen, which will soon eliminate the sloppy system of hand quenching with its "drowning" and unavoidable breaking up of the coke. Other equipment for the benzol and naphthalene plants has also been purchased from the same firm. A second turbo-generator has been bought. There is no question that all new construction will be on strictly modern lines. And when one considers the tremendous reserves of coal and iron ore in the Kuznetz Basin, he can have no doubt that the Kemerovo plant is only the pioneer of many others that will some day turn this region into one of the greatest metallurgical and chemical centers of the world.

No Danger of Lead Poisoning From Ethyl Gasoline

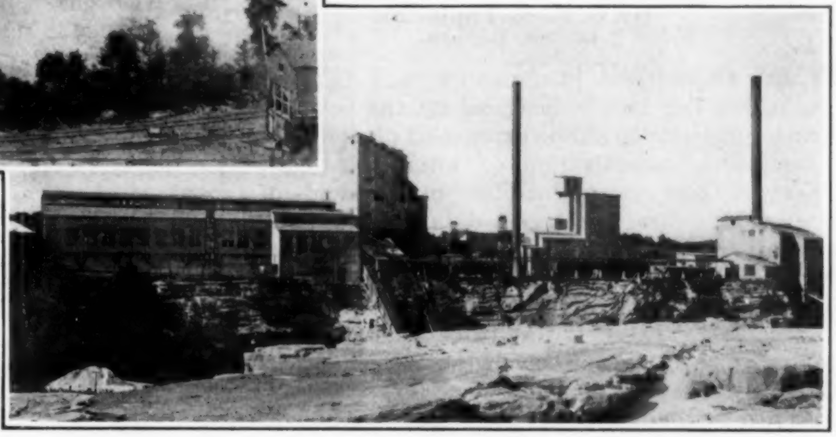
The results of a protracted series of experiments with various types of small animals subjected to the products of combustion from ethyl gasoline, conducted by the Interior Department at the Pittsburgh experiment station of the Bureau of Mines, indicate that any possible increased hazard from automobile engine exhaust gases due to the use of tetra-ethyl lead in gasoline is inappreciable. The animals used in the experiments, although exposed for 188 days to unusual concentrations of exhaust gases from ethyl gasoline, showed no symptoms of lead poisoning.

Ethyl gasoline, one of the widely used anti-knock fuels, is ordinary motor gasoline to which has been added 3 c.c. of tetra-ethyl lead and 2 c.c. of a halogen carrier, as ethylene dibromide or trichlorethylene, or approximately 0.06 per cent of the lead compound and 0.04 per cent of ethylene dibromide by volume. Ethyl gasoline should not be confused with ethyl fluid, which is a mixture of concentrated tetra-ethyl lead and ethylene dibromide in the proper proportions for mixing with gasoline, but is not a motor fuel and is not sold to the public. Also tetra-ethyl lead is not a motor fuel, and likewise is not sold to the public.

Because of its interest in the public health hazard of automobile exhaust gases, the Bureau of Mines investigated ethyl gasoline by exposing rabbits, guinea pigs, pigeons, dogs and monkeys for certain periods each day to the maximum concentration of exhaust gas possible without carbon monoxide poisoning. At the end of 8 months, with the exception of a few of the animals that died from causes ascertained to be other than lead, all remained normal as to activity, growth, appetite and general signs of health.

In the investigations the air of the test chamber was continually passing over exhaust scale in amount greater than would ever collect on streets. Also this scale was kept in constant agitation by the vibration of the engine. This indicates the remote danger of sufficient accumulation of lead on the streets through discharge of scale from automobile engines to cause lead poisoning.

(AT LEFT) One of the greatest newsprint plants in the world has located directly at the site of a hydroelectric plant, for power is the principal requirement. A secondary factor in the location is that the river also brings down the pulp wood that forms the raw material.

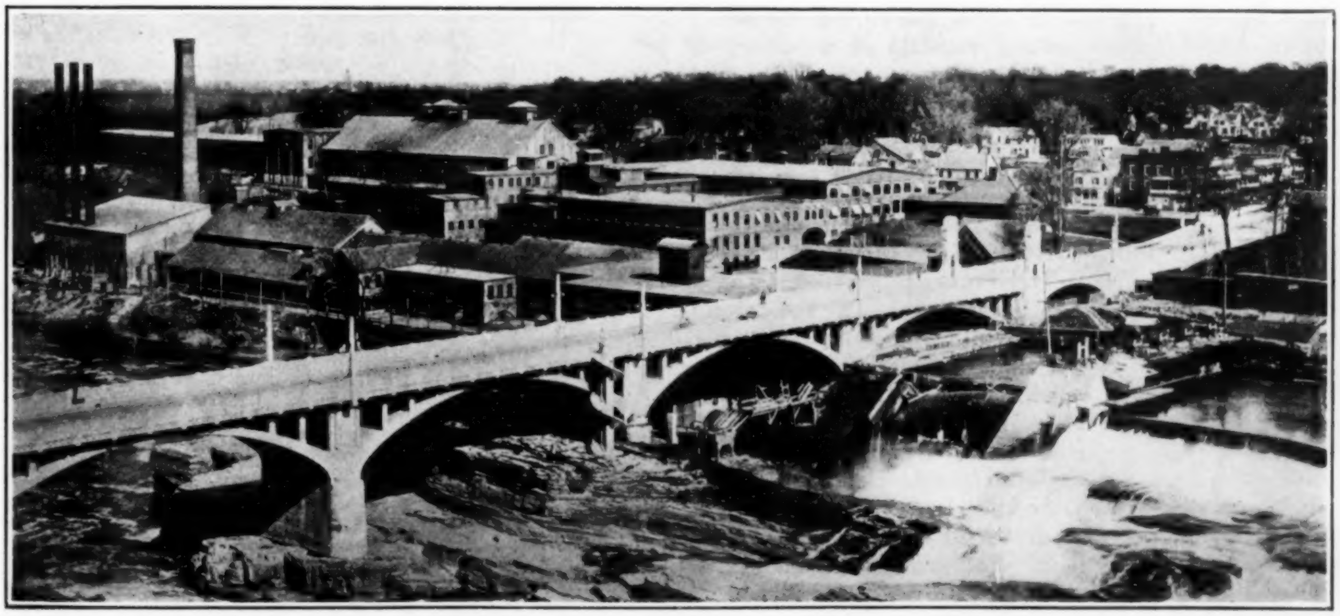


(AT RIGHT) Plants making glass and refractories, depending on silica sand for their raw material, almost invariably locate near a deposit of this substance. The factory shown here is, as can be seen, directly at the glass sand quarry. Such a location generally carries with it the proximity of an ample labor supply and convenient transportation to consuming centers. Since this is the case, the one fact, of a convenient supply of raw material is generally sufficient to determine the location of the plant.

(BELOW) Here is a plant making paper of various kinds, that has been located at a small hydro-electric development about midway between the source of raw material and the market, in a region of ample labor supply. Such an opportunity to effect a proper balance is seldom obtained; but when it is, the alert plant will take full advantage of it.

Where Should the Plant Be Located?

WHEN a factory site is being chosen, there are many points to consider. Shall it be nearest to the source of raw material or the market, if these chance to be widely separated? Is power availability or labor supply an important factor? Is the transportation problem adequately solved for the location? Often one of these factors is the deciding point, while in other cases a compromise must be reached among all of these and many others. The plants shown here should serve to illustrate how some industries have their plant sites and may prove suggestive to others.



British Process for

Low-Temperature Carbonization

Tested by Government Bureau

By C. H. S. Tupholme
London, England

THE Department of Scientific and Industrial Research has been empowered by the government to conduct tests at the public expense of plants for the low-temperature carbonization of bituminous coal. The object of these tests is to place in the hands of those interested accurate technical data on the quality and quantity of yields, the throughput of the plant, the operating temperatures and the general ease of working, together with such information as it may be possible to ascertain. The first test to be conducted on such a basis has been carried out on the Parker low-temperature carbonization plant at Barnsley, and the results obtained by the officials of the Department of Scientific and Industrial Research should do much to win the confidence of the public and that of some rather skeptical engineers and chemists in the commercial possibilities of low-temperature distillation of bituminous coal.

A description of the operating principles of the Parker process has already appeared in *Chem. & Met.* (vol. 29, 1923, p. 233), and it is not necessary to repeat them here. Briefly, the tests showed that the throughput for the thirty-two retorts tested would be 50 tons of coal per day, and that the yields were satisfactory both in quantity and quality; they were, on the average, slightly better than those that have been obtained with similar coal on an intermediate scale at His Majesty's Fuel Research Station. Certain defects in the plant appeared during the course of the trial, but the government chemists consider that there should be no difficulty in overcoming these in future designs.

The general layout of the plant is shown in Fig. 1. The pipe lines and recovery plant had not been specially constructed to suit the setting under examination, but had been altered and adapted from the services of a former plant. The setting not in use during the test is shown dotted. Each setting consists of a battery of thirty-two retorts, arranged as shown, the offtake pipe of each leading to a hydraulic main running along the side of the setting.

Gas From Cooling Coke Helps Heat Retorts

The retort consists essentially of an iron casting in one piece containing twelve vertical tubes arranged as shown in the drawing. These tubes taper from 4½ in. in diameter at the top to 5½ in. in diameter at the bottom, and are 9 ft. in length. A special iron swing door, operated by a wheel on the charging platform, closes the bottom of the retort tubes and separates them from the cooling chamber. This chamber is built of brick, and one chamber is provided for each pair of retorts. A gas-tight door allows access to this chamber for discharging coke. When the coke is cooling in the chamber, any gas liberated is drawn off into a secondary main below the hydraulic main. The gas leaving the system passes through a governor to an air-cooled condenser, a tar extractor, an oil-washing plant, a rotary gas meter and finally to a holder of 25,000 cu.ft. capacity. In this holder it is mixed with the producer gas and the mixture is used as a fuel gas to heat the settings. Two main seals are provided, one at the end of each hydraulic main, and from these the tar and liquor flow to a collecting tank. The tar and liquor from the condenser and from the seals flow to a different collecting tank.

Each retort was heated from two combustion chambers separated from it by a perforated brick wall. The fuel gas, a mixture of coal gas and producer gas, was burned in these chambers, and the hot gases were passed through the retorts, the air for combustion being supplied through open ports in the side of the chambers. The average temperatures of the combustion chambers varied from 800 to 1,000 deg. C., while those of the retorts varied between 550 and 650 deg. C.

The labor required was thirteen men, but this could be reduced by the installation of mechanical devices, such as for operating the bottom doors of the retorts.

The coke discharged is left to cool in the chamber until just before the next charge is due, 4 hours later. Cooling is accelerated by running a small stream of water continuously into the chamber. A few minutes after discharge the coke is lifted by forks into an iron skip and removed. The breeze remaining on the ground is lifted at longer intervals.

The control arrangements consist only in maintaining a pressure of —0.1 to —0.3 in. on the hydraulic main, and of maintaining the carbonizing temperatures at from 620 to 660 deg. C. A small stream of water is run into each hydraulic main to help to keep these cool during working.

The proximate analysis of the coal used was:

	First 34 tons Carbonized, Per Cent	Remaining 58 Tons Carbonized, Per Cent
Moisture	2.70	2.30
Volatile matter less moisture	36.20	35.42
Fixed carbon	56.10	57.84
Ash	5.00	4.44
	100.00	100.00
Moisture as charged	4.30	5.72

The ultimate analysis of the dry average sample was: carbon 80.05 per cent, hydrogen 4.95, sulphur 1.10, nitrogen 1.60, oxygen 7.40, ash 4.75 per cent.

A weight balance and thermal balance were prepared of the Barnsley test and gave:

Weight Balance	Tons
Coal charged at 5.2 per cent moisture	91.66
Water to hydraulic main	1.81
	93.47
Coke discharged, dry	63.81
Tar collected, dry	8.10
Liquor collected	10.73
Spirit collected, dry	0.60
Gas collected, saturated	9.78
	93.02

The loss amounts to 0.45 ton and is regarded as very satisfactory.

Thermal Balance	Per Cent
Coal charged, at 13,640 B.t.u.	100.0
Coke discharged, at 13,720 B.t.u.	70.1
Gas, scrubbed, at 705 B.t.u./cu.ft.	13.0
Tar, at 16,540 B.t.u./lb.	10.7
Spirit, at 20,000 B.t.u./lb.	1.0
	94.8

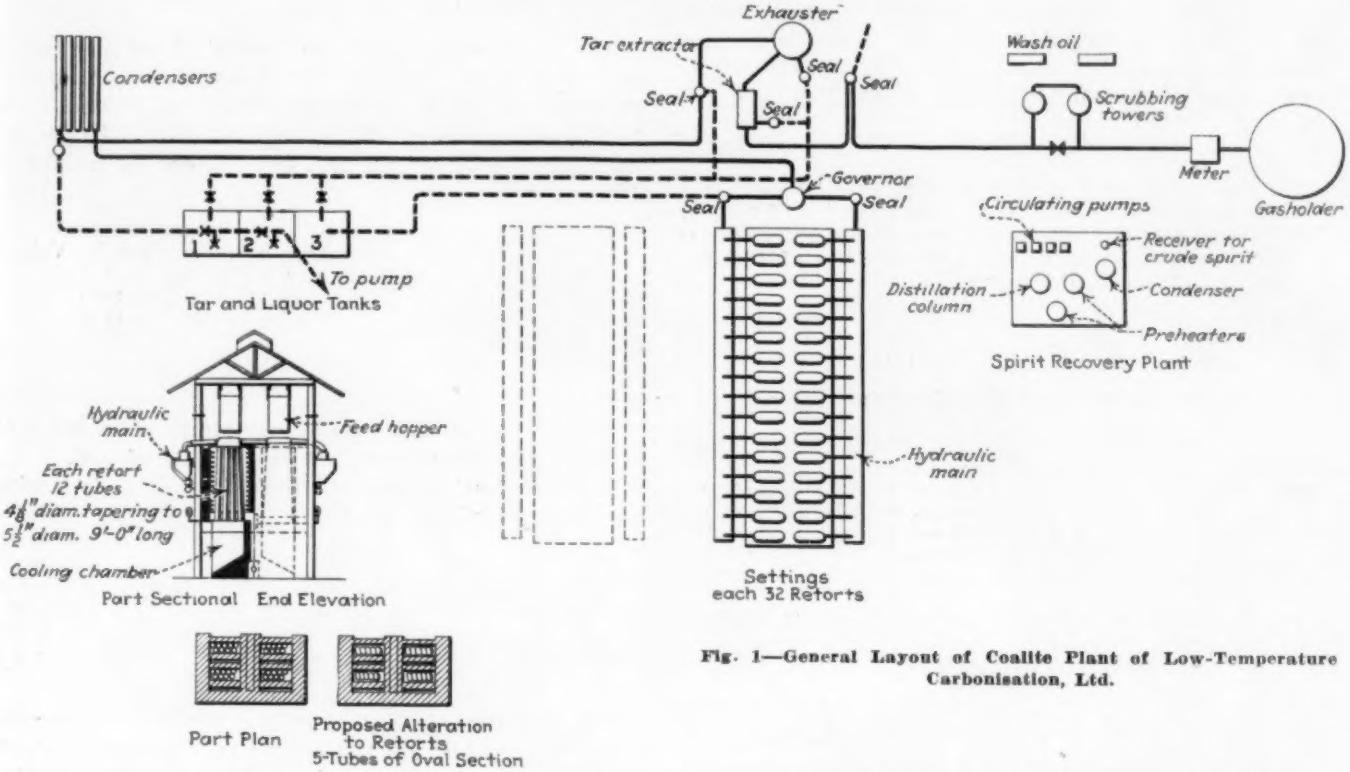


Fig. 1—General Layout of Coalite Plant of Low-Temperature Carbonisation, Ltd.

The difference of 5.2 per cent of the heat units in the coal is regarded as satisfactory.

Yield of Low-Temperature Coke

The coke, or "coalite," discharged was in the form of 2- or 3-in. cubes, the cylinders of coke showing a consistent tendency to break up into triangular pieces about 3 in. long. The fuel was dark gray, with a slight silvery luster. In texture it was hard and compact, except in the center of the retort, where there was a cellular core of about 1 in. diameter. The presence of this cellular core seems to indicate that the admixture of a small percentage of non-caking coal would have been advantageous. The amount of breeze—that is, passing a ½-in. sieve—averaged 4.67 per cent of the coke discharged. Two bags, each of 1 cwt., were dispatched on an 8-day freight train trip to ascertain breakage; at the end of that time 56 per cent remained on a 2-in. sieve, while only 1.6 per cent passed a ½-in. sieve. Uniformity of size is noteworthy, as 40 per cent of the total is represented by 1- to 2-in. pieces.

The coke, on analysis, showed:

	Per Cent
Moisture	3.40
Volatile matter less moisture	4.20
Fixed carbon	86.00
Ash	6.40

The calorific value of the dry coke was 13,720 B.t.u. The ultimate analysis of the dry coke was carbon 86.02 per cent, hydrogen 1.98, sulphur 0.94, nitrogen 1.78, ash 6.62, and 2.66 per cent oxygen by difference.

A fire was lighted with paper and wood in the usual manner and kept going for eight hours. The coke ignited readily and gave a good glowing fire. The flame produced was very slight, but otherwise the appearance of the fire and the rate of combustion were very satisfactory.

Gas Yield

The variation in gas yield is shown in the chart (Fig. 2). The gas yielded on the plant gave the following figures:

Volume of gas produced per hour, cu.ft. 10,970

	Analysis in Per Cent		*Analysis in Per Cent*
CO_2	4.0	H_2	37.2
C_nH_m	4.3	$C_nH_{2n}+2$	39.6
O_2	1.0	N_2	7.8
CO	6.1		
			100.0

Calorific value B.t.u. per cu.ft. calculated 700
Calorific value B.t.u. per cu.ft., mean, from chart in Fig. 2 .. 705

Light Spirit Recovered

Light spirit was recovered from the gas by scrubbing with creosote oil. The crude product collected amounted

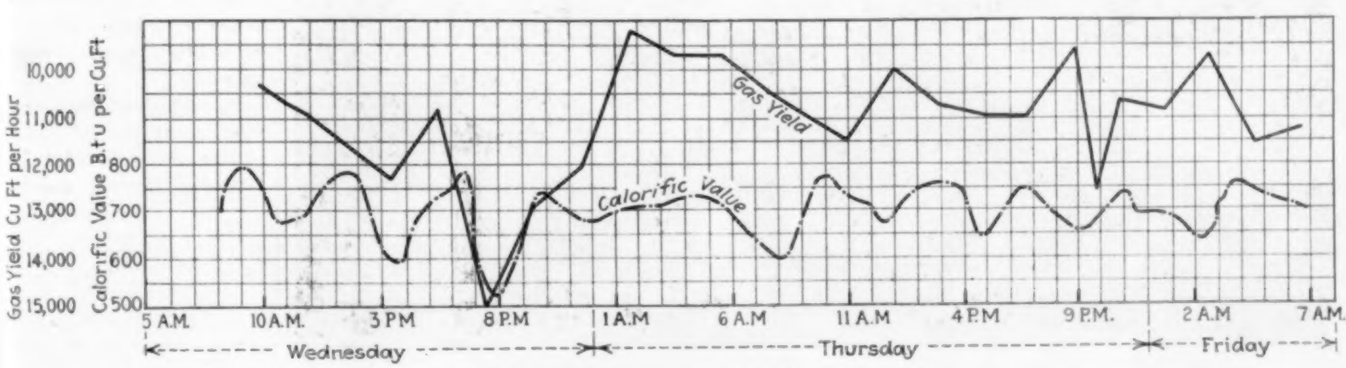


Fig. 2—Variation in Yield and Calorific Value of Gas

in all to 176 gal. (the coal carbonized altogether was 92 tons). This was distilled to 200 deg. C. to free it from wash oil and refined by the Engler method to 170 deg. C. The summary of yield per ton of coal distilled is:

1. Yield of crude product, 176 gal. = 1.92 gal. per ton of coal.
2. On removal of wash oil this product gave 92.5 per cent crude spirit to 200 deg. C., or 1.78 gal. per ton of coal.
3. On refining this crude spirit a loss of 7.6 per cent was experienced on washing, and a further loss of 12.5 per cent on distillation to 170 deg. C.

Crude spirit	= 1.78 gal. per ton of coal
Washed spirit	= 1.62 gal. per ton of coal
Refined spirit to 170 deg. C.	= 1.39 gal. per ton of coal

The distillation range of the refined spirit was:

	Per Cent		Per Cent
40 deg. C.	First drop	130 deg. C.	75.1
80 deg. C.	2.5	140 deg. C.	86.9
90 deg. C.	8.9	150 deg. C.	92.4
100 deg. C.	24.2	160 deg. C.	96.0
110 deg. C.	44.5	170 deg. C.	98.0
120 deg. C.	61.0		

The iodine value of the refined spirit was 41 (Wijs).

Gas Liquor

The total yield of liquor over the period of the test was 2,382 gal. or 26 gal. per ton of coal carbonized. The percentage of ammonia in the average liquor amounted to 1.33 per cent by weight, which is equivalent to 13.55 lb. of pure ammonium sulphate per ton of coal.

To sum up, the yields per ton of coal on this plant have been established as:

Coke, cwt.	13.92	Liquor, gal.	26.00
Gas, cu.ft.	5,620	Crude spirit, gal.	1.78
Tar, gal.	18.62	Ammonium sulphate, lb	13.55

Tar

The tar yield was 1,707 gal., or 18.62 gal. per ton of coal carbonized. This tar had a calorific value, dry, of 16,540 B.t.u. per lb., a specific gravity at 15 deg. C. of 1.063, and contained 1.20 per cent sulphur. The preliminary distillation of the tar, percentages by weight of dry tar, were:

	Per Cent	Tar Acids, Per Cent by Volume
To 170 deg. C.	4.7	5.6
170 to 230 deg. C.	14.9	38.0
230 to 270 deg. C.	12.9	41.0
270 to 310 deg. C.	18.1	26.0
Pitch	48.4	....
Loss	1.0	....

The total yield of tar acids amounts to 17.06 per cent by volume of the tar, or 3.18 gal. per ton of coal.

The first fraction was examined further to determine the yield of refined spirit:

	Gal.
Yield of crude fraction	1.090
Tar acids	0.061
Loss on acid washing	0.117
Yield after refining	0.812
Yield after distillation to 170 deg. C.	0.756

This quantity of spirit, together with that recovered from the gas (1.78 gal.), gives a total recovery of crude spirit of 2.87 gal., or of refined spirit 2.16 gal. per ton of coal carbonized.

Dr. C. H. Lander, Director of Fuel Research, makes a number of suggestions for improving the design of the plant, among which are that the heat insulation could be improved, and he also remarks that the combustion chambers are badly designed.

Photo by Ewing Galloway.

Chemical Engineering in Jugoslavia

This plant at Jajce (pronounce it Jayce) in Bosnia, which is one of the Jugoslavian States, is engaged in the manufacture of bleaching powder. It is indicative of a prosperity in Jugoslavia that is greater than that of the larger European countries, according to our correspondent.

Note the lime quarry on the hill at the left, and at the right a dam for developing electric power.

The Mixing of Rubber Compounds

A Discussion From the Compounder Viewpoint of the Factors Affecting Mixing Mill Operation

By R. B. Stringfield

Manager Service Laboratories, Goodyear Tire & Rubber Co., Akron, Ohio

ALTHOUGH the mixing operation is one of the first steps in the manufacture of rubber goods, the published literature on the subject is very meager, the excellent articles by H. C. Young[1] which appeared in 1923 being practically the only attempt to give specific data. In view of this and of the millions of dollars spent each year for mixing alone, it is proposed to discuss some of the fundamental facts and factors involved, and if this serves in any way to promote further discussion or the exchange of information on milling, it is believed the industry will be benefited.

Rubber compounds are milled for two and only two purposes:

(1) Blending—that is, to blend the rubber or rubbers and to incorporate and uniformly mix with them any curing agents or compounding ingredients desired.

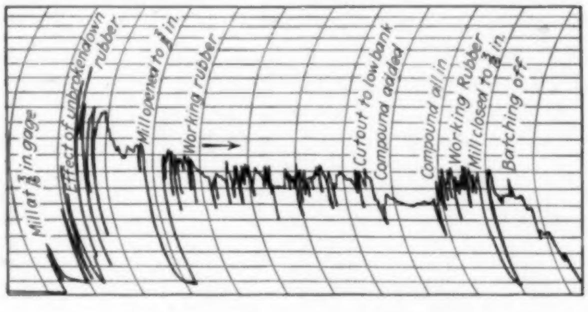


Fig. 1—Power Chart, Lightly Loaded Friction Stock

Batch 160 lb., 39 min., 84-in. mill, mixed on small roll, ratio 1.0 to 1.28. Kw.-hr., front roll 24.8, rear roll 25.0, total 49.8. Kw.-hr. per lb. 0.311. Average input to motors, 76.6 kw., 102.7 hp. Peaks on curve represent about 200 hp.

(2) Softening—that is, to soften the rubber or compound and thereby render it more suitable for a subsequent operation.

Production, for convenience, is usually expressed in terms of pounds per mill-hour. Four factors limit the amount that can be produced from a mixing mill:

(1) The required softness of the stock.

(2) The time required for compound to mill in.

(3) The danger of scorching or premature vulcanization.

(4) The amount of stock a man can handle.

The bulk of the tonnage of rubber compounds is still handled on the two-roll mixing mill, the design of which has undergone little change in many years. This type of mill consists essentially of two hollow cast-steel rolls, which may be of the same or slightly differing sizes. Thickness of the walls of the rolls depends on the size of the mill, the larger mills being usually 5 in. thick. Entering each roll through a gland in one end is a perforated pipe, which sprays cooling water at high velocity against the upper half of the inside of the roll, the water collecting until the roll is half full and overflowing through an opening in the gland. Approximately 3 cu.ft. of water per minute is required for an 84-in. mill. One roll is connected to the source of power through a large gear or "bull wheel" and drives the other roll through gears with extra long teeth to permit the distance between the rolls to be varied. It is customary to gear the rolls so that the face speed of the rear roll is greater than that of the front roll, mixing being usually done on the front or slow roll.

For large-scale production, the 84-in. mill may be considered the standard unit. Let us consider for a moment some of the problems involved. We are to mix, say, a high-grade tread stock, running two 150-lb. batches in 30 minutes each, or 300 lb. per mill-hour. To do this we will use at least 250 watt-hours per lb., or 75 kw.-hr. per mill-hour, costing us, at 2c. per kw.-hr., \$1.50 per mill-hour. Labor of one mill man will cost us, say, 80c., and maintenance, trucking and overhead another 70c., making \$3 per hour for the cost of operating our mill, or 1c. per lb. of milled stock.

Bearing and gear friction and motor losses will take from 10 to 20 per cent of the power, the remainder appearing as heat in the batch. Assuming this to be 80 per cent, we have 200 watt-hours per lb. turned into heat in the batch, or 683 B.t.u. per lb., 204,900 B.t.u. per mill-hour to be disposed of. As the specific heat of the stock is about 0.35, if this heat generated were not carried away, the batch temperature would rise to 1,950 deg. F., a bright red heat.

Actually, of course, 80 to 90 per cent of this heat generated is carried away in the cooling water. The common 84-in. mill with hollow rolls 5 in. thick has a heat transfer capacity under normal operating conditions of more than 300,000 B.t.u. per hour. This, however, presupposes a clean mill and effective spray pipes. A broken spray pipe, removing the effect of water velocity on the inner surface of the roll, will greatly decrease the cooling capacity and only the thinnest film of scale or slime is required to cut the capacity

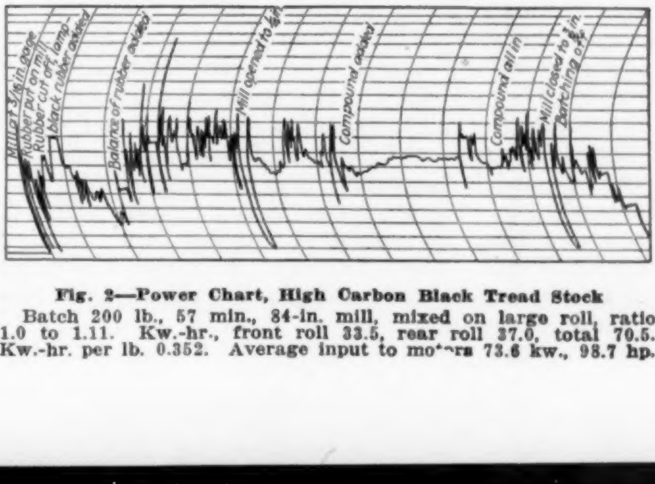


Fig. 2—Power Chart, High Carbon Black Tread Stock

Batch 200 lb., 57 min., 84-in. mill, mixed on large roll, ratio 1.0 to 1.11. Kw.-hr., front roll 33.5, rear roll 37.0, total 70.5. Kw.-hr. per lb. 0.352. Average input to mo*ors 73.6 kw., 98.7 hp.

Presented before the Division of Rubber Chemistry at the sixty-eighth meeting of the American Chemical Society, Ithaca, N. Y., Sept. 8-13, 1924.

[1] "Some Mechanical Problems in the Rubber Industry," H. C. Young, *India Rubber Journal*, vol. 65, pp. 364A-366, 405-10, 499-53, 487-90, 529-31, 579-80 (1923).

"Power Losses in Rubber Machinery," H. C. Young, *India Rubber Journal*, vol. 66, pp. 679-84 (1923). *Rubber Age*, London, vol. 4, pp. 505-10, 1923.

down to one-third or less, which of course under heavy service immediately shows up as scorched batches.

The Goodyear Tire & Rubber Co. installed in 1914 a 60-in. mill having the individual rolls driven by separate variable speed motors, making it possible to obtain any speed and ratio of face speeds when mixing on either roll. Since that time a great deal of milling data has been accumulated, and the following paragraphs will attempt to present in condensed form some of these data and the conclusions drawn from them. Most of the more recent work has been done on an 84-in. mill with rolls 26 and 22.2 in. diameter respectively, a size commonly used in the industry. So far there has not been the opportunity to compare results from this mill with similar work from an 84-in. mill with even size 24-in. rolls, such as are often used, which comparison would doubtless give interesting results. Also most of this

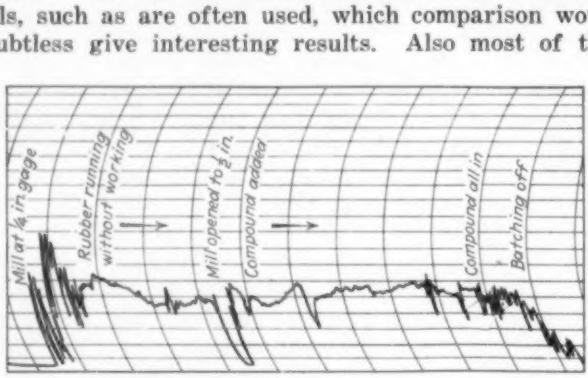


Fig. 3—Power Chart, Heavily Loaded Heel Stock
Batch 300 lb., 43 min., 84-in. mill, mixed on large roll, ratio 1.0 to 1.02. Kw.-hr., front roll 23.8, rear roll 28.5, total 52.3. Kw.-hr. per lb., 0.174. Average input to motors 73.0 kw., 97.8 hp.

work was done before plasticity measurements were in vogue, which is very regrettable, as they would have added much to the value of the data. At the first opportunity we expect to repeat considerable portions of the work, taking advantage of the latest data on milling and plasticity, and should add considerably to our knowledge of mixing-mill operation.

Before going further let us see what the driving motor is called upon to do. Figs. 1, 2 and 3 show power curves for three typical types of stock. Several features should be noted. In Fig. 1, the high points at the start of the curve are typical of batches carrying large amounts of unbroken down rubber. On this chart the peak represents about 200 hp., and peaks of 300 hp. are not uncommon. As it is customary in selecting motors to allow 1 hp. per in. of mill face, it can be seen that severe overloads are common, and in operating a line of mills on one motor, care should be taken to stagger batches so that peaks from the different batches do not come at the same time. The peaks in Fig. 2 come later in the batch on account of the more careful handling of lampblack rubber at the start, while in Fig. 3, where the batch carries broken down rubber and shoddy, the peaks are very much lower. All three charts show the typical drop in power that occurs when compound is first added, there apparently being a little slippage of the stock either on the roll or on itself, followed by a gradual increase in power consumption as the compound is taken up. The effect of allowing the rubber to run without cutting is well shown in Fig. 3, the curve dropping rapidly at first but soon becoming practically flat. The effect of cutting into the batch for mixing can be easily seen, every cut making a drop followed by a peak.

The object of milling studies is to reduce the cost of mixing per pound of stock. This can be accomplished either by reducing the power consumption on a given batch or by increasing the output per mill-hour, which means reducing the cost of labor and overhead per pound, and possibly also of power. Our interest is in the operating factors which will affect these items.

We may first consider the speed of the mill. The accepted safe speed for the front roll on which the stock is worked is from 90 to 95 ft. per minute, but a skilled mill man can handle stock without trouble at a speed 10 to 20 per cent greater than this. This, however, introduces difficulties. Extra speed means more power and consequently higher stock temperatures. This in turn means softening by heat instead of by mechanical working, danger of scorching and tougher finished stock. On a heavily loaded batch, with repeated trials we have been unable to work compound in any faster at 105 ft. per minute than at 94 ft. per minute, the powder dropping through the rolls more and requiring the same length of time to work in. The only possible advantages in sight, then, are on breaking down rubber or milling lightly loaded or pure gum stocks, and as the ordinary mill has not the cooling capacity to prevent the stock temperature from rising, the chances of gain are very slight.

The face speed of the rear roll divided by the face speed of the front roll is called the "ratio" of the mill. Practice varies widely, the writer knowing of installations at ratios from 1.00 (even speed) to 1.67. The following conclusions are drawn after study of the results of a great many tests on a production scale and after experience with several types of installations:

(1) The average power input to the mill increases

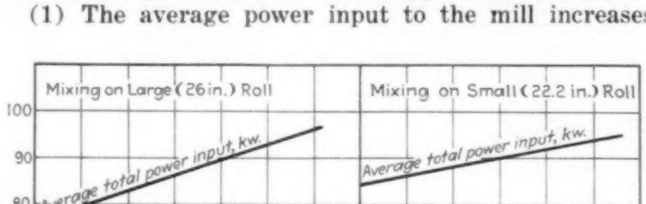


Fig. 4—Power Input and Distribution vs. Ratio of Face Speeds
Tread stock mixed under identical conditions except for ratios and roll sizes.

with increasing ratio (Fig. 4), and the momentary peak loads also increase, and with high ratios and tough rubber become excessively high.

(2) Breakdown of the rubber increases with increasing ratio, but at ratios above about 1.25, tough rubbers begin slipping on the roll and the additional softness of the stock, if any, is not proportional to the additional power required.

(3) Compound goes in rapidly and smoothly at even speed and ratios have little or no effect upon the time required. Moreover, with high ratios, the compound tends to drop through the rolls and requires more shoveling to work in. There is seemingly a time factor involved, compound requiring an appreciable time while

going through the "nip" of the rolls for best results.

(4) It is advantageous, therefore, for production purposes to employ two different types of mills where possible, viz.: (*a*) mills with a ratio of 1.25 or slightly less for high-grade gum stocks where breakdown of the rubber is the essential feature and little compound has to be milled in, (*b*) mills with a ratio around 1.10 for highly loaded stocks, this ratio being high enough to allow fairly rapid breakdown of rubber and to give at the same time good operating characteristics while compounding.

Two observations in connection with the above work have not as yet been satisfactorily explained. In the case of 84-in. mills with 26- and 22-in. diameter rolls, it is customary to install the large roll as the front or slow roll, this being the natural thing to do, as it has the greater cooling area and is easier to work on. It has been observed, however, that with certain heavily compounded stocks, by making the 22-in. roll the front or slow roll, compound works in faster and production can be increased about 10 per cent, the "angle of nip" between the rubber and the bare roll apparently affecting the rate at which compound works in. The observations have been checked on several different stocks and with several different mill men to eliminate any personal element, gage and other factors being held constant.

The other phenomenon is shown graphically in Fig. 4. If stock is placed on the large roll with the rolls at even speed, power is equally divided between the two rolls, and as the rear roll is speeded up, it takes more and more of the power. If, however, stock is placed on the small roll with the rolls again at even speed, instead of the power being equally divided, more than 60 per cent is used by the small roll, and as the large roll is speeded up to increase the ratio, although it consumes more and more power, the distribution does not become equal until a ratio of about 1.30. A comparison with even size rolls would be interesting but is not available.

Fig. 5 shows clearly how power input varies with the gage of stock on a mill. The exact shape of the curve at the minimum point is questionable, but the

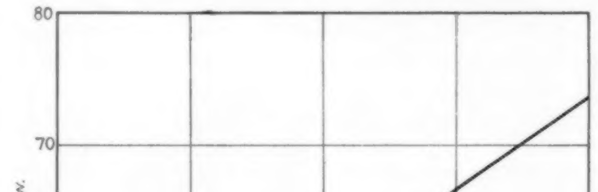


Fig. 5—Power Input vs. Mill Opening
Power required by broken-down friction stock at various gages on 84-in. mill, large roll, 26 in. diameter, small roll, 22.2 in.

existence of a minimum has been shown repeatedly. The gage at which this minimum occurs varies slightly with the ratio of the mill, being less at high ratios. It is also less when the stock is mixed on the small roll, and probably is affected slightly by the type of stock. It will be noted that the power input is not at all proportional to the size of the batch—that is, assuming the batch at ½-in. gage to be twice as large as that ¼-in. gage, the power input is only about 20 per cent greater.

The conclusion should not be drawn from the above that the heavier the gage a batch can be operated the more the rubber is being broken down, as the plasticity of a stock is not a function of the power input alone but rather of power input at a given temperature. Referring to Fig. 6, the difference in the power required for

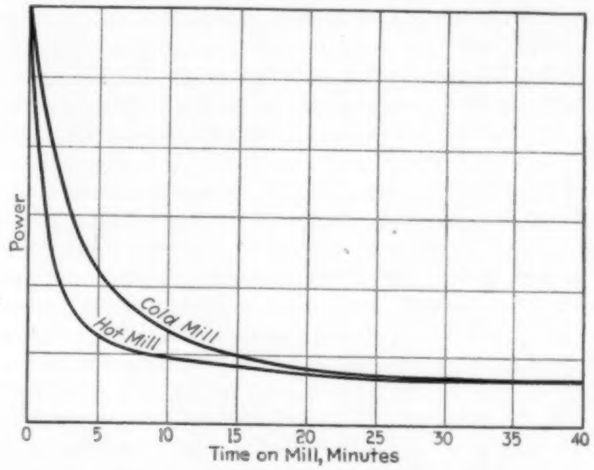


Fig. 6—Power Input vs. Milling Time

hot and cold breaking down is shown and also the rapidity with which the power input falls during the first few minutes and becomes practically constant. Once this level portion of the curve is reached, additional softening is accomplished very slowly. Vogt for instance (in his Report of Physical Testing Committee, Division of Rubber Chemistry, American Chemical Society, April 1, 1924, meeting) mentions a nearly pure gum stock with the following milling characteristics:

Milling Time, Min.	Milling Temp., Deg. C.	Plasticity K_3
13	100	3.8
26	100	3.0
54	100	2.4
30	40	1.6
60	40	1.2
120	40	1.1

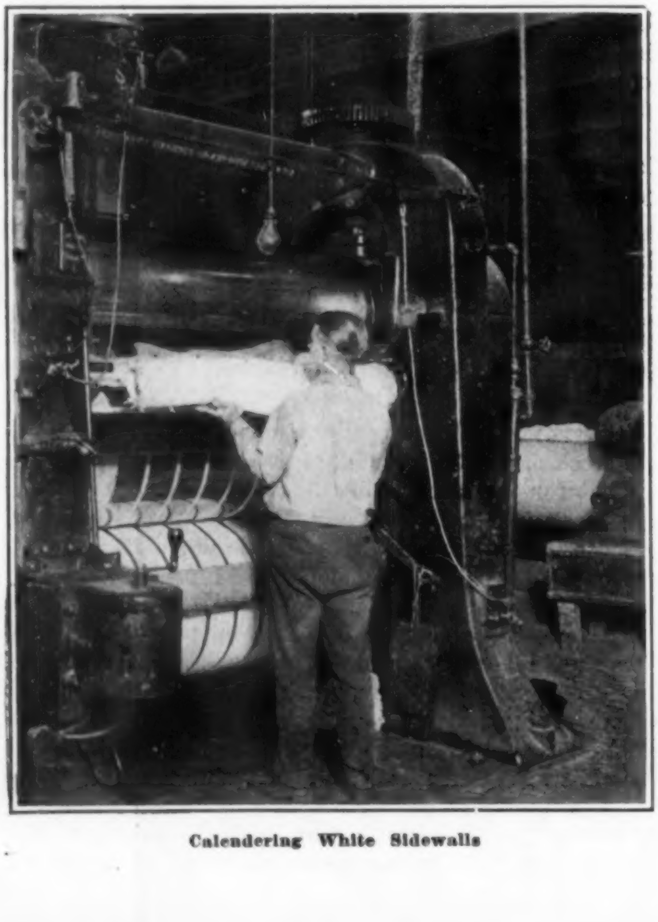
It is hardly to be supposed that the power input for the stock milled 30 minutes at 40 deg. C. was as much as that for the stock milled 54 minutes at 100 deg. C., and yet it is milled much softer. The slight difference in plasticity between the stocks milled 26 and 54 minutes at 100 deg. C., and 60 and 120 minutes at 40 deg. C. is very noticeable.

The effect of the type of batch on power consumption should be mentioned. Various lots of rubber of any given grade differ among themselves in the amount of power required to break them down to the same plasticity, but the average over a period of time will show little difference for the different grades. The effect of breaking down or massing rubber on a separate mill is to furnish a much more uniform rubber to the mixing mills, and by taking off the peak of the power

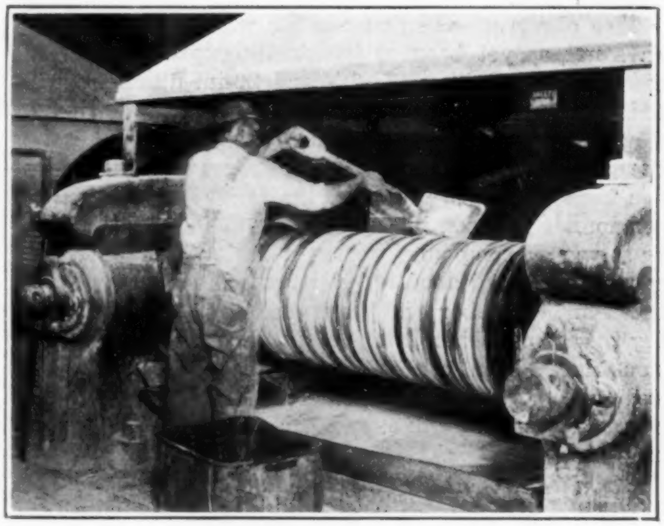
requirements for breakdown, render the mixing-mill operation noticeably easier. Various compounds behave differently when milling in, both as to power and time required. Zinc oxide, for instance, mills into a compound faster than the same volume of carbon black, but requires almost as much power, as the rate of power consumption is higher; barytes or whiting requires much less time and less power than either. The use of softeners, so prevalent at the present time, does not appreciably reduce the rate of power consumption, but does shorten the milling time and speed up the rate at which compound will mill in, both effects being important from a production standpoint.

The large batches handled in many plants introduce so many factors that it is difficult to generalize. As previously noted, power does not increase proportionately to gage, but gage plays a very important part in ease of handling and in the rate at which compound will mill in. Power increases slightly with increasing size of the bank between rolls up to the maximum size of bank that is still actually rolling and working. Beyond this, further additions of rubber do not affect the power.

The emphasis placed on power in this paper may seem to be out of proportion to its importance, but it should be remembered that power is or should always be a larger item in mixing cost than labor. Maintenance and overhead, moreover, are usually proportional to mill hours rather than to tons of stock. Therefore, any increase in production measured in pounds per mill-hour usually makes a saving not only in labor but in maintenance and overhead as well. Production is a combination of batch weight and mixing time; 150 lb. in 30 minutes and 300 lb. in 60 minutes both mean the same production, but it is often practical to run, say, 150 lb. in 30 minutes where the larger batch would be out of the question on account of the thicker gage required, trouble from scorching, bulk of the batch, etc., and the opposite is occasionally true. With certain types of batches it is profitable to use gang-mill operation—that is, to mix different parts of the same batch on separate mills and put on another mill for blending, or to start a batch on one mill and finish on another at different temperature or gage. Many batches are most economically handled by one man to a mill, while others save money by having a helper for several mills or even two men per mill. It should also be kept in mind that it is very easy to save money at the mills and spend even more at the calenders or other processing, the first being essentially a one-man operation and the second using several men. Any time that taking a few pounds off or adding a few minutes to a batch will speed up later handling or lessen defects, it usually pays to do so.

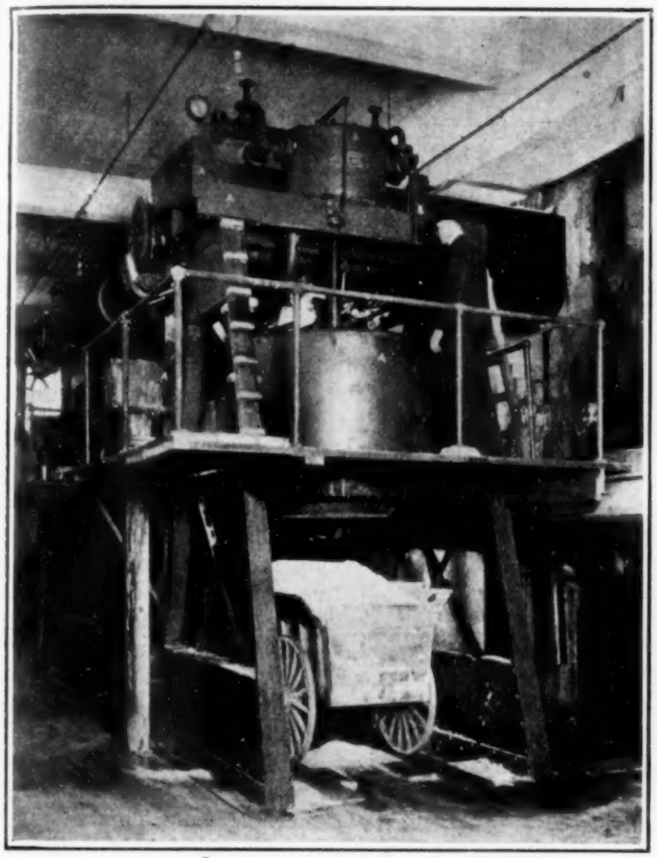


Calendering White Sidewalls



Mixing Rubber on an 84-In. Mill

The foregoing has referred principally to mixing operations on the common two-roll mixing mill, but before closing mention should be made of the use of internal mixers. In the first place, any internal mixer that we now know requires a batching-off mill and a man to operate it, or at least three men for two units. It must therefore have from one and a half to two times the production of an 84-in. mill to break even. In the second place, the cooling area per pound of stock is less than that on a regular mill, and batches tend to run appreciably hotter, though the thinner wall of metal between the water and the stock tends to reduce this difference. If the batch runs hotter, it appears softer when first sheeted out, but after cooling the stock will be found to be tougher than usual at the warm-up mill. On account of this heat factor, there is little chance of power saving on high-grade or nearly pure gum stocks, but on the type of batch where the limiting factor is the speed with which compound mills in, provided scorching and dispersion of fillers can be properly controlled, the internal mixer has considerable possibilities, especially as the batch is a fairly good conductor of heat. In the field of blending and breaking down rubber and making pigment non-productives where no curing agents are present, intelligent use of internal mixers should also produce interesting results.



Water-Driven Centrifugal Operating on Sodium Chloride

Extractors or driers of this sort are used successfully in handling a number of inorganic salts such as sodium carbonate and bicarbonate, glaubers salt, silver nitrate and copper sulphate. Organic compounds, including anthracene, naphthalene, phenol and aniline salts; citric, picric and sulphonic acids are also dried very frequently in these machines.

Salt Centrifugals in Action on Chlorides

THE centrifugal provides nearly ideal equipment for large-scale filtration and washing operations, providing only that the character of the material to be handled allows its use. Solutions containing crystalline compounds that will not pack or mat under pressure are especially suited to this method of processing.

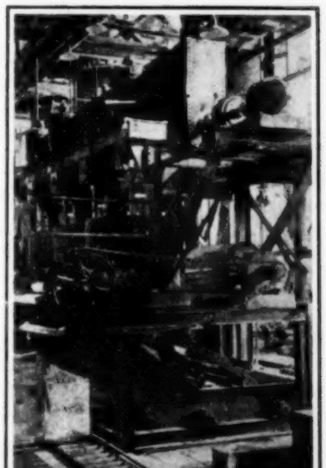
The fineness of the crystals may become an important factor when it is extreme, since the same effect is then likely to be obtained as with amorphous or gelatinous precipitates. Twenty to 80 per cent of solids in a mixture allows economical drying with this apparatus. Depending upon the speed the cake shows a tendency toward packing, with the result that permeability is lowered and filtration is slowed down.

The small illustrations below are of machines working on potassium chloride, the one above of a unit on sodium chloride. The former are at the plant of the American Trona Corporation, Searles Lake, Calif., the latter is in the Union Salt Co.'s plant, Cleveland, Ohio.

The object of the processes in which this equipment is used is primarily to produce marketable salts from natural brines. At Searles Lake the natural brine along with mother liquors and wash water is evaporated to the saturation point, cooled, first with fresh brine and then by refrigeration, until a crystal crop is formed. The crystal mother-liquor mixture is agitated in the feed trough shown above the machines and is then dropped to the 40x24-in. steel baskets, each of which filters and washes 540 tons of salt per day. Note that these machines are overslung, direct motor driven, with no external resistance boxes. At the extreme right may be seen the conveyor system, whereby the finished salt is carried out from under the machines and into boxes located on rollways.

The picture above illustrates the somewhat novel arrangement of an overslung machine driven directly at 870 r.p.m. by a water centrifugal. The bronze basket, 24x48 in., handles 1,100 lb. of salt per batch, and an average of twelve batches is put through per hour. The salt solution in this case comes directly from multiple effect evaporators, to which the filtrate and wash waters are returned. Note the buggy that holds just one batch into which the salt is dropped.

Next to sugar, probably no materials handled in the chemical engineering industries lend themselves so readily to separation from liquors as do salts of this nature. The field of usefulness of centrifugal separators is wide, however, even with definite limitations imposed by the nature of the compounds that can be handled.

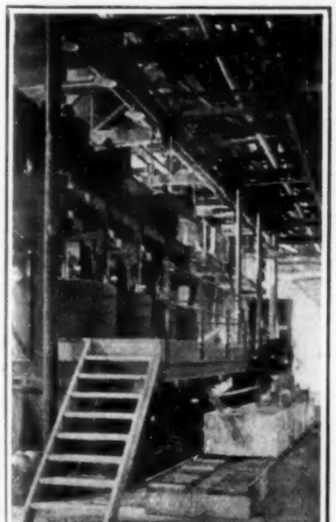


At Right, Rear View of Machines at Trona

In lower part of picture the method of conveying away the finished product is shown.

Centrifugal Whizzers Working on Potassium Chloride

At left the operating platform of an installation in the California desert at plant of the American Trona Corporation.



A New Class of Activated Carbons

Alkaline Impregnated Chars, Peculiarly Adapted for Metal Adsorption, Show Many Properties Commonly Ascribed to Colloids

By Ralph H. McKee and Paul M. Horton

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> Alkaline activated chars, which can be used for removing metals such as gold or silver from their solutions, are structurally identical with ordinary decolorizing carbons and can easily be converted into them by acid treatment. But this change is not mere neutralization, for the original properties cannot be restored by alkaline washing. A drastic treatment with alkali at about 850 deg. C. is required. Like colloids, the alkaline char remains suspended in water, possesses an electrical charge (negative) and at a definite p_H (3.8) flocculates and settles rapidly. At this p_H it becomes electrically neutral, loses its metal adsorbing power and becomes an ordinary decolorizing char.

BLACK ash residue (the material left after extracting the calcined liquors from the soda-pulp process for manufacturing paper pulp) is an alkaline char and can be used directly as a decolorizing char in strongly acid liquors. However, for use in cane sugar solutions where approximate neutrality is always maintained, it is practically inert unless previously acid treated. The strength of acid employed is immaterial if it is above a certain low limit. This point is observed in technical practice by adding acid to the alkaline char suspended in water and noting the point where the suspension "clears" or begins to settle rapidly. The finely ground alkaline char will remain in suspension for several days, but upon adding acid it will settle in a few minutes. Further addition of acid beyond this point improves the char very little if any.

The results obtained by plotting the time of settling against the acidity of suspensions of alkaline sugar char are shown in Fig. 1. This char was prepared by dissolving 100 grams of sugar and 20 grams of sodium carbonate in a little water and then gradually raising the heat to 600 deg. C. The resulting char was washed as free from alkali as possible, dried and ground to pass through a 100-mesh sieve. This material is a soft, velvety black char and not the usual hard, shiny char obtained by heating sugar alone. The chars used in the settling test were filtered out, washed and dried. The p_H of the suspensions was measured with the quinhydrone electrode at 25 deg. C.

The decolorizing power of the dried char from these tests was determined in a neutral caramel solution by the method already described by one of the present writers (Horton). The results are plotted in Fig. 2. It should be noted that, although the char giving maximum efficiency has been treated with acid of p_H 3.5, it was previously washed and dried before testing. Actually when this char is suspended in water the reaction is between p_H 4 and p_H 5.5 and not p_H 3.5, as might be be expected. That this is a general case will be shown later.

An assortment of chars were next washed thoroughly, dried and suspended for 24 hours in distilled water (2 grams per 100 c.c.). After filtering out the carbons, the p_H of the filtrate was measured with the quinhydrone electrode at 25 deg. C. The results are shown in Table I. An interesting feature of this series of tests is that all the chars had been washed on a Buchner funnel until the runnings were neutral to litmus paper or nearly p_H 7.

Item 2 represents a sample taken from 100 grams of 200-mesh black ash residue boiled up with successive portions of 1,000 c.c. of distilled water and filtered, until the filtrates totaled about 50 liters. This indicates the futility of trying to wash a char commercially to a given reaction using pure water. Furthermore, the chars seem to group in three classes, of which the examples given are representative. Those made with alkali and heated to 500-600 deg. C. seem to wash more nearly neutral, those heated to 900 deg. C. or above seem to retain the alkali and have a fixed reaction of about p_H 8, while the acid-washed chars give a value of about p_H 4.5. This method used with caution will throw considerable light on the nature of an unknown char and the nature of the treatment it has received.

The action of the various chars under the influence of an electrical field is interesting. The alkaline chars when suspended in pure water move toward the positive pole, whereas the acid-treated chars are practically stationary. This indicates that the alkaline chars are negatively charged and that the acid-treated chars are neutral or at the isoelectric point. The ability of a decolorizing char to adsorb either acid or basic colors is thus explained. Cane juice is decolorized in slightly acid solution, while cottonseed oil is usually made alkaline in order to be decolorized. The char assumes the opposite sign to the body adsorbed.

It will thus be seen that a char made with soluble alkaline impregnating agents, such as sodium carbonate, and then thoroughly washed will be practically inert in a neutral or only slightly acid solution. If this char is previously treated with acid and washed (and even ignited to red heat), it now behaves as a normal decolorizing char. This change in the nature of the char is

Table I—Reaction of Filtrates From Various Chars

Char	p_H of Filtrate
(1) Black ash residue, washed	8.25
(2) Black ash residue, extra washed	8.20
(3) Sugar char made with sodium carbonate and heated to 900 deg. C	8.34
(4) Pine char made with sodium carbonate and heated to 600 deg. C	7.38
(5) Sugar char made with sodium hydroxide and heated to 500 deg. C	7.23
(6) Water used	6.1
(7) Commercial Norit	8.23
(8) Acid-washed Norit	4.30
(9) Commercial Darco	4.98
(10) Black ash residue, acid washed	4.26

fundamental and has nothing to do with the question of the reaction of the medium to be decolorized. In other words, the char has been conditioned to act in a specific manner. This point has been very generally ignored in the study of decolorizing chars. However, the original alkaline char is very effective as a metal adsorbent, which property is practically lost on treatment with acid and is not regained by treating the char with an aqueous solution of an alkali.

Factors Favoring Metal Adsorption

Mainly because of lower cost and greater ease of determination, solutions of copper salts were used in the preliminary study of metal adsorption. However, copper is by no means as easily adsorbed from solution

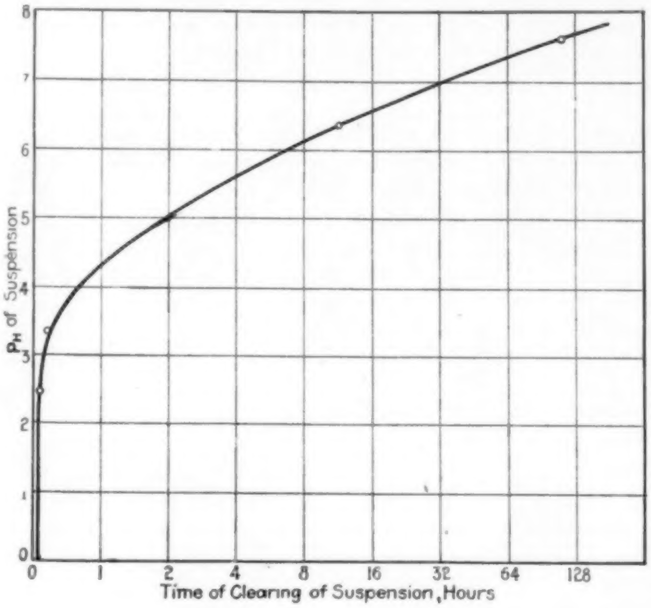


Fig. 1—Effect of Acidity on the Settling of Alkaline Char

It will be observed that the effect of the acid reaches a maximum at p_H 4 to 3.4. This might be called "the clearing point" of the char.

as gold; hence variations in the char toward increased copper adsorption represent a considerable increase in the gold adsorption. In fact, a char having no copper-precipitating power may even be fairly effective in an aurocyanide solution.

In order to determine the effect of acid treatment on copper adsorption by alkaline charcoal, the remaining portions of the char samples used for the clearing time experiments were treated with solutions of copper sulphate. The method employed in all of the following tests was briefly this: a 1.0000-gram sample of the char was suspended in 100 c.c. of approximately 0.1 molar copper sulphate solution for 24 hours. The char was then filtered off through a dry paper and the first 20 c.c. discarded. The remaining filtrate was mixed and a 25-c.c. aliquot titrated for copper. The iodide and cyanide procedures were used with practically the same results.

Table II—Effect of Acidity on Cu Adsorption

Original Concentration of Solution Gram Cu Per 100 c.c.	Per Cent of Copper Adsorbed	p_H of the Filtrate
0.5997	3.4	4.37
0.5997	1.7	4.22
0.5997	0.6	3.73
0.5997	0.3	1.66

The effect of acid treatment is indicated in Fig. 3 and is more strikingly demonstrated in the following experiment:

Solutions containing varying amounts of added acid and a constant concentration of copper were treated with 100-mesh black ash residue and both the concentration change of copper and the p_H of the filtrate determined. The results are given in Table II and plotted in Fig. 4.

Table III—Effect of Ammoniacal Solution on Cu Adsorption

Char	Solution	Per Cent of Copper Adsorbed
Black ash residue	$CuSO_4$	27.7
Black ash residue	$CuSO_4 + NH_4OH$	10.J
Sugar char 500° C	$CuSO_4$	26.6
Sugar char 500° C	$CuSO_4 + NH_4HO$	8.4
Sugar char 900° C	$CuSO_4$	25.7
Sugar char 900° C	$CuSO_4 + NH_4OH$	5.6
Black ash residue	$CuSO_4 + KCN$	Trace only

Original solution = 0.3448 gram copper per 100 c.c.

Decreasing acidity would appear to be favorable to metal precipitation by char. This effect cannot be pursued into the alkaline range, since copper would be chemically precipitated. On the other hand, if an alkali such as ammonium hydroxide is added which forms a soluble complex in alkaline solution, the effect of decreasing acidity is overbalanced by the decreased copper-ion concentration or activity. Hence, we should

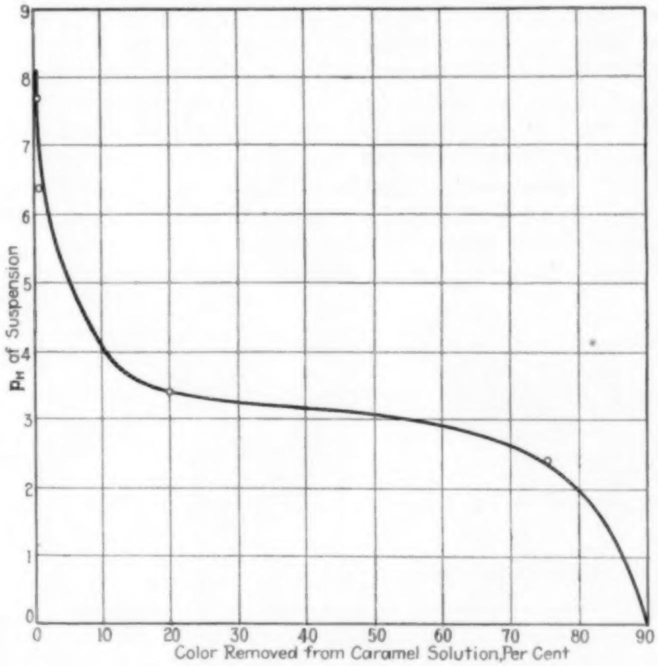


Table II—Effect of Acidity on Cu Adsorption of Alkaline Char

The maximum activity is reached with a char that has been suspended in an acid of about p_H 3.5, which corresponds closely with the clearing point indicated in Fig. 1.

expect to find little adsorption in an ammoniacal solution and practically none in a cuprocyanide solution. The copper-ion concentration (activity) in the latter solution is extremely low. The results of a few tests in this direction are given in Table III.

The next point of interest is the variation in copper adsorbed with the concentration of copper in solution. This is best illustrated with an adsorption isotherm. In addition to the change in concentration, we have determined the p_H of the original solution and the filtrate. The results of one set of measurements at 25 deg. C. are given in Table IV.

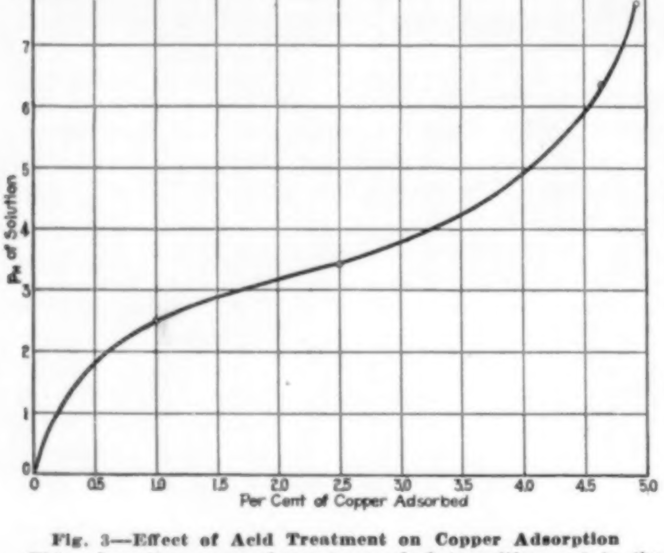


Fig. 3—Effect of Acid Treatment on Copper Adsorption
This adsorption curve shows no marked transition, yet in the case of chars treated with acid stronger than p_H 4, the copper drops off rapidly.

The percentage of copper adsorbed is plotted against the original concentration in Fig. 5. This appears to have the ordinary form of an adsorption curve. However, it should be noted that in case the adsorption is less than 5 per cent, the concentration plays no part. In Fig. 5 are also plotted the p_H of both the original solution and the filtrates. In the more concentrated solutions the filtrate is less acid than the original solution by a constant amount (about 0.62 p_H) until the adsorption becomes 5 per cent or greater. After this point is reached the acidities of the solution and filtrate approach each other and at about 20 per cent adsorption they are the same, or there is no change in acidity during adsorption. It is believed that the explanation

Table IV—Variation in Cu Adsorption With Solution Concentration

Concentration Original Solution (Grams of Cu Per 1,000 c.c.)	Concentration Filtrate	Per Cent of Copper Adsorbed	p_H of the Filtrate
73.185	72.340	1.10	3.76
54.888	54.060	1.51	3.92
36.592	35.836	2.07	4.02
18.296	17.636	3.60	4.17
10.977	10.540	3.95	4.29
7.318	6.854	6.42	4.35
3.659	3.230	11.6	4.45
1.829	1.530	15.7	4.54
0.732	0.476	36.5	4.81

Table V—Effect of Heating Time on Cu Adsorption

Black ash residue impregnated with 1 per cent sodium carbonate heated at 950 deg. C.

1 hour gave	5.43 per cent copper adsorbed
2 hours gave	5.40 per cent copper adsorbed
3 hours gave	5.40 per cent copper adsorbed
4 hours gave	5.49 per cent copper adsorbed
5 hours gave	5.41 per cent copper adsorbed
7 hours gave	5.38 per cent copper adsorbed

Table VI—Effect of Alkali Concentration on Cu Adsorption

Black ash residue heated for 1 hour at 950 deg. C. with

0.0 per cent sodium carbonate gave	5.35 per cent copper adsorbed
0.5 per cent sodium carbonate gave	5.20 per cent copper adsorbed
1.0 per cent sodium carbonate gave	5.31 per cent copper adsorbed
3.0 per cent sodium carbonate gave	5.38 per cent copper adsorbed
5.0 per cent sodium carbonate gave	5.35 per cent copper adsorbed
10.0 per cent sodium carbonate gave	5.35 per cent copper adsorbed

Table VII—Effect of Alkaline Activation on Different Chars

Char	Conc. of Filtrate Gram Cu Per 100 c.c.	Per Cent of Cu Adsorbed
Crude sugar char	0.6531	—2.5
Treated sugar char	0.6186	+2.5
Crude pine char	0.6450	—1.4
Treated pine char	0.6364	—0.06
Crude black ash residue	0.6032	+5.1
Treated black ash residue	0.5992	+5.8

Conc. of original solution = 0.6360 gram per 100 c.c.

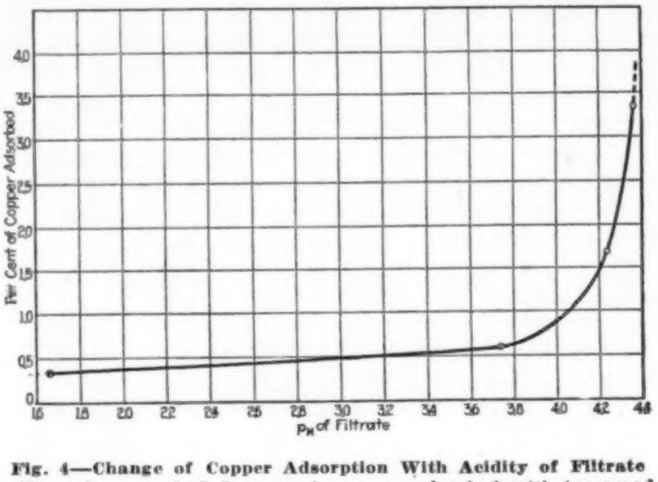


Fig. 4—Change of Copper Adsorption With Acidity of Filtrate
There is a marked decrease in copper adsorbed with increased acidity—the maximum effect occurring at p_H 4 to 3.8.

of these facts does not lie in the relative amounts of copper adsorbed as much as in the acidity of the original solution. If the copper sulphate solution is more acid than about p_H 3.5 to p_H 3.8, the char is at once deactivated, the copper is only slightly adsorbed and the alkali in the char simply reacts in a chemical way with the free acid in the solution. There are various ways of looking at this matter, however, and about the only valid deduction we may draw is that acidity due to hydrolysis will affect the adsorption if it is above a certain point. This may explain certain erratic values noted in the literature.

In U. S. Patent 1,372,971 of McKee it is stated that the metal-adsorbing power of ordinary wood charcoal is greatly increased by an alkaline treatment at moderately elevated temperatures. The following are the results of an attempt to activate various carbons in this manner:

The first carbon treated was black ash residue, a carbon which in the process of making has been heated with sodium carbonate. It was found that as far as copper precipitating power is concerned neither time of heating nor concentration of alkali used is a factor in activating this substance, as is shown in Tables V and VI.

It is evident that recalcining black ash residue with sodium carbonate is not the complete explanation of its very remarkable metal-adsorbing power. The effect

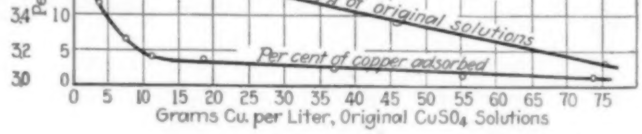


Fig. 5—Change of Copper Adsorption With Original Concentration of Solutions
When the adsorption is less than 5 per cent, there is practically no change with concentration. The p_H of both the original solution and the filtrates is shown in the other curves. They approach each other at about 20 per cent adsorption.

of heating other chars with sodium carbonate is shown in Table VII.

The crude chars were prepared by heating the raw materials in a lightly covered iron pan to about 600 deg. C. The crude char was ground and a portion heated with 5 per cent sodium carbonate to 950 deg. C. for 2 hours. This product was washed and dried and constituted the treated chars.

With regard to copper the raw sugar and pine chars are negative adsorbents (concentration of solution increases) and the treatment with sodium carbonate improves them very little.

The relative inertness of the sugar and pine char toward activation leads to the belief that black ash residue has been activated during the process of its manufacture and any increase in activity brought about by calcining with alkali is to some extent due to the presence of partly carbonized material. This is shown by the fact that sugar char made at 450 deg. C. and cooled before all vapors have been evolved can be activated partly by heating to 950 deg. C. with alkali. This condition of affairs will not hold for the adsorption of gold from aurocyanide solution, however.

Sugar char prepared by charring a mixture of sugar and sodium carbonate is a soft black material in all ways similar to black ash residue, and is prepared by the same process. Black ash residue is therefore a chance specimen of the more general class of alkaline impregnated chars, the third class of impregnated chars described in the preceding paper. (See *Chem. & Met.*, vol. 32, pp. 13.) The value of this method of activating charcoal for gold adsorption will be discussed in a subsequent article.

Bentonite and Its Uses

WITHIN recent years much attention has been focused on the interesting properties of bentonite, which has been referred to as colloidal clay because the behavior of its suspensions in water closely simulates that of true colloids. It has been defined by the United States Geological Survey as "a transported, stratified clay formed by the alteration of volcanic ash shortly after deposition."

Producers in United States

In the United States, the most important producers of bentonite are: the Owyhee Chemical Products Co., with deposits at Medicine Bow, Wyo., and a grinding plant at Cheyenne; and the Wyoming Bentonite Co., with a mine at Clay Spur, near Newcastle, Wyo. In both cases the bentonite occurs as a surface outcrop, easily mined. The Owyhee company markets crude clay, coarsely ground clay and a finely powdered product, "Wilkinite."

At Ardmore, S. D., the Refinite Co. has a deposit that has been worked extensively for water-softener material.

At Otay, near San Diego, Calif., about 10,000 tons of clay, variously termed "otaylite," montmorillionite and bentonite, has been mined for use in oil refining. Between Barstow and Daggett, in San Bernardino County, 3,000 tons of a light, cream-colored clay has been mined by the Master Products Co., Los Angeles.

In the Shoshone district, bentonite has been mined by the Associated Oil Co., San Francisco, for refining petroleum products, and by the Filtrol Co., Los Angeles, for clarifying vegetable oils and fats.

Canadian Deposits

Although bentonite occurrences have been investigated in Manitoba, Saskatchewan, Alberta and British Columbia, none have been developed. Those at Rosedale, Alta.; Knollys, Sask., and Princeton, B. C., seem most promising.

An Outline of Possible Uses

Present and suggested uses may be briefly summarized as follows:

Cement. Small amounts increase mechanical strength of concrete.

Ceramics. Suspending agent in pottery and enamel slips; bonding and plasticizing agent.

Dewatering Agent. For removing water from petroleum, gasoline and oils, as well as from air and gases.

Dye Industry. Mordant and base for lake colors.

Emulsions. Bentonite acts both as accelerator and stabilizer for water-oil emulsions. Emulsification of asphalt, coal-tar and pitch. Extracting asphalt from tar sands.

Explosives. Absorbent for nitroglycerine in dynamite.

Fertilizers. Filler of active nature.

Horticultural Sprays. Extremely sticky nature of bentonite-water mixtures as well as emulsifying properties suggest use as spreading agent for insecticides.

Paints. Filler, suspending agent and base for lake colors; also for cold water paints and calsomines.

Paste and Size. Although sticky, adhesive properties not of value. Useful as size for cotton yarn, textiles, cordage, etc.

Pencils, Crayons and Inks. For crayons, indelible leads, pastel colors, etc., compounded with wax or greases; not where water is used as in ordinary black lead pencils, because of excessive drying shrinkage; in place of clay in printers' inks.

Pharmaceuticals and Cosmetics. High absorptive power responsible for application in "beauty clays" and other cosmetics.

Pulp and Paper. De-inking newsprint; retention of china clay loader; overcoming gumming of screens; filler.

Refining Oils and Fats. Acid-treated bentonite is used in petroleum refining and in clarifying and bleaching vegetable and animal oils and fats.

Putty. Possible substitute for whiting.

Soap and Detergents. It is claimed that bentonite can actually replace from 25 to 50 per cent of soap substance in hard and soft soaps, the product being equal if not superior to straight soap. In scouring textiles, it is claimed that bentonite has a superior bottoming effect on yarns and fabrics and produces a better finish.

Stove Polish. Bonding agent for cake or paste polishes, reducing amount of clay required for given bulk.

Water Softening. South Dakota bentonite is used in two of the best known water softeners on the American market, as it belongs to the class of base-exchange silicates.

Abstracted from a 36-page report, "Bentonite," by Hugh S. Spence, of the Mines Branch, Department of Mines, Ottawa, Canada.

On the Engineer's Book Shelf

Fundamentals of Heat Economy in Chemical and Metallurgical Industries

Reviewed by W. Trinks

Professor of Mechanical Engineering, Carnegie Institute of Technology

HEAT ECONOMY OF POWER PLANTS AND COMBUSTION EQUIPMENT IN INDUSTRY, WITH PARTICULAR REFERENCE TO THE IRON, PAPER AND CHEMICAL INDUSTRIES. By *Wilhelm Tafel*, professor at the Polytechnicum in Breslau, Germany. 349 pages, 125 illustrations. R. Oldenbourg, Munich; G. E. Stechert & Co., New York.

The never-ending increase of technical applications of physics and chemistry leaves very little time for the teacher in engineering to discuss those fundamentals that are common to different lines of engineering. Professor Tafel, who teaches what might be called the mechanical engineering of the chemical industries, found himself in this position and decided to write a text that would show the application of heat and combustion engineering to the various branches of engineering, and more particularly to steel works engineering and chemical engineering. This text is arranged as follows: The principles of thermodynamics as foundation of heat economy; Diesel engines and gas engines; steam engines and steam turbines, including boilers, superheaters and steam regenerators. Then follow the principles of combustion, including regeneration and recuperation of combustion air and the movement of gases in furnaces.

The next chapter takes up the losses on combustion of fuels and efficiency of combustion, and is followed by construction and operation of various combustion devices and furnaces. There are also two very short chapters on heating of factories and on measurements in connection with combustion devices. The third part contains applications to special industries, more particularly to the iron and steel industry. The heat economy of the blast furnace is discussed in detail, while the heat economy of the converter, of the open-hearth and of the electric furnace is given somewhat more briefly. The applications of heat economy to the rolling mill and to the rolling-mill furnace are investigated in some detail. The chapter on the chemical industries deals particularly with steam for heating and power generation, with losses in steam pipes, with bleeder turbines, and engines, injectors, pulsometers, and heat transfer in cooking and evaporation equipment. A very brief chapter deals with paper manufacture.

Those who can read German will enjoy the book, because it gives a birdseye view of heat economy in the various industries. Those who specialize in heat economy and in combustion engineering will perhaps find fault with the rather general treatment which Professor Tafel gives the subject, but the detailed treatment which the specialist is looking for can be given in a text book. The book is destined and intended particularly for students of chemical and metallurgical engineering, and does indeed fill the bill of giving them that fundamental knowledge of the application of heat which they need later on in their daily work, with the understanding that additional and more detailed knowledge must be gained afterward by actual experience or by reading of trade papers and scientific publications.

The very praiseworthy effort of Professor Tafel will doubtless be appreciated much more in Germany than in the United States, not only because of the difficulty which most American engineers have in reading German but also on account of the fact that fuel economy is very much more important in Germany than it is in the United States. In Germany, fuel is expensive and labor is cheap, whereas in most parts of the United States, fuel is comparatively cheap and labor is dear. Nevertheless, fuel is becoming more expensive right along, even in the United States, and some day we who live in the United States will be compelled to husband our fuel resources just as much as the Germans are compelled to do at the present time. From that standpoint, it will pay to read Professor Tafel's book, because it indicates a trend of development which even the United States will have to undergo sooner or later.

Methods of Chemical Research

Reviewed by Dr. D. B. Keyes

Research Laboratory, U. S. Industrial Alcohol Co.

INTRODUCTION TO ORGANIC RESEARCH. By *E. Emmet Reid*, professor of organic chemistry, Johns Hopkins University. 343 pages. D. Van Nostrand Co., New York. Price, $5.

In writing this book Dr. Reid has taken an unusually liberal attitude. He quotes extensively from many authors and he has obtained the aid of many of his friends. This method of treatment has produced a very pleasing and interesting treatise.

Dr. Reid's book is not confined to organic chemistry, and therefore will hold the attention of everyone interested in chemical research.

Research has been considered too long as mysterious "black art," and any book that attempts to tear away the veil of mysticism is a real contribution to science and civilization. Dr. Reid quotes from Dr. W. H. Nichols as follows: "Scientific discovery is really not a haphazard matter. The art of making it can be cultivated and definite rules of research can be laid down."

In order to give the reader a clear idea of these rules, 85 per cent of the subject matter of this book is given over to this general subject.

Dr. Reid states in his introduction that a research man must be "pure in heart." We have heard of the romance and ethics of research, but pureness of heart is a distinctly new qualification for a researcher. Another qualification demanded by the author is "acquaintance with many things outside of chemistry." This is another acknowledgment of the fact that our university curriculums are far from ideal.

Dr. Reid's remarks on industrial research laboratories are particularly interesting. He states that "some managements expect a laboratory to be an immediate source of profit to the company." This not only is sometimes true in industries but also in our great

universities. More and more we see the tendency of these universities to hire men to make sensational and half-baked discoveries in order to appeal to their directorate. These discoveries mean newspaper advertising and in turn greater endowments. Dr. Reid points out the need of more time for research for the professor instead of dulling his abilities with routine teaching.

To many young men research is like facing a stone wall and jumping up and down, hoping eventually to have the strength to jump over. The author tries to dispel this illusion. The industrial research man is particularly interested in the method of attack on problems involving the preparation of known compounds. Dr. Reid devotes one chapter to this subject, but a whole book could be written by merely enlarging the number of factors involved and methods of varying them. Temperature, pressure and concentration are only three of the great number of factors entering into a reaction.

The reviewer cannot agree with Dr. Reid's suggestion that the "decimal" and regular library system be applied to the cataloging of chemical information. These systems have proved efficient for large general libraries, but they have been found to be unwieldy and cumbersome for use in small specialized libraries. This is particularly true when chemical articles are subject indexed instead of title indexed.

Dr. Crane is quoted as follows: "Persistence is a good qualification for index searching. It is desirable to avoid being too soon satisfied. There is no task in which thoroughness is more important." This seems to be the primary requisite of a literature search.

W. W. Ammen has written an excellent and concise chapter on patent searches. The details are there, but no space is wasted with superfluous description. Dr. Reid seems to favor the common method of withholding important details in patent specifications. Modern patent lawyers believe this to be a dangerous practice.

The author strikes the keynote of industrial organic research by stating that the application of simple physical-chemical principles to organic chemical reactions has produced "brilliant results."

Dr. Herchfelder has written a splendid chapter on the synthesis of medicinals, indicating the relation between constitution and physiological effects.

Dr. Rice has clearly shown the infinite complexity of the study of reactions.

Perhaps one of the most interesting chapters from the industrial man's viewpoint is that by Dr. Stine on "Plant Process From Laboratory Experiments." We only wish more space could have been devoted to this subject. This chapter outlines the function of the research chemical engineers. Dr. Stine would have the scientific researchers appreciate the problems of plant-scale development and follow the work up to a successful production basis. This has its disadvantages, because the scientific workers may refuse to follow profitable leads because of inaccurate estimate of the development difficulties. In other words, it is very seldom that one man has the ability to solve both the problems of the laboratory and the semi-works plants. Men with the proper foundation and with experience in development can usually take half-finished problems from the laboratory and work them out on a semi-commercial scale. The laboratory worker should maintain his interest in the development work, but care should be taken that he does not waste time trying to obtain 100 per cent efficiency and figuring possible costs. His advice and interest is greatly to be desired, but he should not be forced to carry the entire weight of responsibility.

Dr. Reid's clear-cut style and ready wit indicates to the reader that Dr. Reid practices what he preaches in the last chapter. One infers that he believes good English is as essential as purity of heart.

Intermediate Physics

A TEXTBOOK OF INTERMEDIATE PHYSICS. By *H. Moore*, assistant director of research, British Scientific Instrument Research Association. 824 pages, 560 diagrams. E. P. Dutton & Co., New York. Price, $9.

Between the outlines of physics used in many college courses to impart the fundamental notions of this science and the highly specialized works covering individual phases of the subject there has been a gap that should be bridged most satisfactorily by Mr. Moore's book. Frequently in the reviewer's experience it has been necessary to take into consideration a phase of physics somewhat foreign to the daily routine. Attempts to gain the desired information from advanced reference works would often disclose that the latter took for granted fundamentals that had become hazy through disuse. Nor would recourse to college notes and texts solve the problem, for the treatment was usually found to be too general to give just the details wanted.

In cases such as this Mr. Moore's text will prove of great assistance, for in each section the discussion is carried from first principles right through to the point where the specialized treatises begin. In the author's words: "An intermediate course must be more or less complete in itself; the treatment of each branch of the subject must commence with a summary of the most elementary phenomena and cannot be considered complete until sufficient facts have been accumulated to enable an hypothesis to be formulated which links these facts together." Here it may be well to add that the branches covered are those usually included in considering the entire field of physics: Properties of matter; heat; sound; light; magnetism; static electricity; current electricity.

For those who would like to brush up on modern concepts of physics the book is particularly to be recommended, as the author has had such readers in mind and has made the descriptions and accompanying diagrams so clear as to be easily understood without supplementary explanation. The chemical engineer, with his diversified interest in applied physics, will do well to fortify himself with such a solid foundation.

A. G. WIKOFF.

Mathematics With Emphasis on Graphical Methods

MATHEMATICS FOR TECHNICAL STUDENTS. By *E. R. Verity*, head of department of mathematics and mechanics, Technical College, Sunderland. 468 pages, with diagrams. Longmans, Green & Co., New York. Price, $4.

An extensive use of graphical methods marks this textbook, which has been written primarily for British students preparing to take the National Senior Course Certificate in Engineering. Algebra, trigonometry and the fundamental processes of differential and integral calculus are illustrated and presented by a graded set of worked examples, which forms a considerable part of the text.

The "Unmaking" of Metals

THE CORROSION OF METALS. By *Ulick R. Evans*, King's College, Cambridge. 212 pages, illustrated. Longmans, Green & Co., New York. Price, $5.

The entire subject has been treated according to the following outline: Historical survey; direct chemical combination of metals with non-metals; passage between metallic and ionic conditions; anodic corrosion by an externally applied current; corrosion with production of hydrogen; corrosion in presence of dissolved oxygen; effect of oxidizing agents on metals; corrosion of copper and its alloys; corrosion in moist and polluted atmospheres; factors affecting velocity of corrosion; prevention; corrosion-resisting materials.

ELECTROLYTIC THEORY OF CORROSION. By *Wilder D. Bancroft*, professor of physical chemistry, Cornell University. 87 pages. National Research Council, Washington, D. C. Price, 25c.

This presentation of Professor Bancroft's views on the electrolytic theory of corrosion was prepared as a report to the corrosion committee of the National Research Council.

Handbook for Gas Engineers

GAS ENGINEERS' COMPENDIUM. Compiled by experts. 292 pages. D. Van Nostrand Co., New York. Price, $8.

Engineering details of British gasworks practice are summarized for ready reference in this volume. In addition to engineering data and tables, there are chapters covering general statistics of the gas industry in Great Britain.

Copper and Cadmium

METALLURGY OF COPPER. By *H. O. Hofman*, late professor of metallurgy, Massachusetts Institute of Technology; revised by *Carle R. Hayward*, associate professor of metallurgy, Massachusetts Institute of Technology. Second edition, 419 pages, 291 illustrations. McGraw-Hill Book Co. New York. Price, $5.

Metallurgical operations in the recovery and refining of copper involve many chemical engineering principles, and the chemical engineer will find much of interest in the discussions of modern practice in smelting, leaching, filtering, precipitation and electrolytic refining.

CADMIUM: ITS METALLURGY, PROPERTIES AND USES. By *Norman F. Budgen*, Ph.D., with foreword by *Thomas Turner*, professor of metallurgy, University of Birmingham. 239 pages, illustrated. Charles Griffin & Co., London; J. B. Lippincott Co., Philadelphia.

Although the metal and its compounds have been known for a long time, there is still no use for cadmium that would warrant an increase of production from the present 150 tons per year to the maximum visible output, 1,000 tons per year. A primary aim of this summary of existing knowledge regarding cadmium is to make data conveniently available for the development of new applications of this interesting metal.

Another Volume of Mellor

COMPREHENSIVE TREATISE ON INORGANIC AND THEORETICAL CHEMISTRY. By *J. W. Mellor*, D.Sc. Vol. V, 1,004 pages, illustrated. Longmans, Green & Co., New York. Price, $20.

As the volumes of the treatise appear, one can but marvel at the unlimited energy of the author and his ability to present the facts of chemistry so concisely without sacrificing readability and interest. Vol. V covers boron, aluminum, gallium, indium, thallium, scandium, the rare earths and the first part of the chapter on carbon. The oxides, hydrides, halides, sulphides, sulphates, carbonates, nitrates and phosphates are considered with the basic elements; the other compounds with the acidic elements.

A.S.T.M. Standards

A.S.T.M. STANDARDS, 1924. 1230 pages. American Society for Testing Materials, Philadelphia. Price, $11 in cloth, $12.50 in half-leather.

Approved standards of the A.S.T.M. are published triennially. The latest compilation includes 220 standard specifications, methods of test, definitions of terms and recommended practices, grouped as follows: Steel, cast iron and wrought iron, 73; non-ferrous metals, 39; cement, lime, gypsum and clay products, 28; preservative coatings, 19; petroleum products and lubricants, 6; road materials, 23; coal and coke, 7; timber, 6; rubber products, 11; textiles, insulating materials and miscellaneous, 8.

Non-Technical Outline of Chemical Industries

CHEMISTRY IN INDUSTRY: A Co-operative Work Intended to Give Examples of the Contributions Made to Industry by Chemistry. Edited by *H. E. Howe*. 372 pages, illustrated. Published by the Chemical Foundation, Inc., New York. Copies may be obtained at cost, $1, from Alexander Williams, secretary American Chemical Society Committee on Prize Essays, 85 Beaver St., New York.

Primarily as an aid to those interested in the American Chemical Society's prize essay contest, there has been added to the popular literature on chemistry this collection of twenty-one monographs, each written by a prominent technologist or scientist, emphasizing the importance of chemistry in his chosen field. The range of industries is that usually covered by the designation chemical and allied industries.

College Texts and Analytical Methods

SMITH'S ELEMENTARY CHEMISTRY. Revised and rewritten by *James Kendall*, professor of chemistry, Columbia University, with the collaboration of: *S. Walter Hoyt*, Mechanic Arts High School, Boston; *J. Colin Moore*, Crane Junior College, Chicago; *J. M. Kelso*, Sacramento High School, Sacramento; *Ellinor Garber*, Shortridge High School, Indianapolis; *Ray McClellen*, Liberty Memorial High School, Lawrence, Kan. 423 pages, illustrated. Century Co., New York. Price, $1.80.

LABORATORY OUTLINE OF SMITH'S ELEMENTARY CHEMISTRY. Revised and rewritten by *James Kendall*, with the collaboration of those noted above. 112 pages, illustrated. Century Co., New York. Price, 75c.

This revision of Alexander Smith's well-known elementary text follows closely the original and insists upon a logical presentation of the subject and a thorough grounding in fundamental theory. It is interesting to note that a second alternative edition is in preparation, in which major emphasis will be placed not upon the derivation of the principles themselves but upon their human and industrial applications.

STRUCTURAL METALLOGRAPHY: An illustrated text with laboratory directions for students. By *H. B. Pulsifer*. 210 pages, illustrated. Chemical Publishing Co., Easton, Pa. Price, $5.

An abundantly illustrated account of metal structures designed to give beginners an introductory presentation of the principles, scope and significance of the science called metallography.

VOLUMETRIC ANALYSIS. By *Francis Sutton*. Eleventh edition, revised throughout, with numerous additions by *W. Lincolne Sutton* and *Alfred E. Johnson*. 629 pages, illustrated. P. Blakiston's Son & Co., Philadelphia. Price, $9.

Equipment News

From Maker and User

Stoker-Fired Stills

By S. A. Coffing

In connection with their process work manufacturers of roofing products operate many direct-fired stills. The chief requirement of the coal-burning apparatus used with these stills is that it shall furnish an even heat. Up to about 2 years ago it had always been the practice in one concern to fire stills of this kind using coal on hand-fired grates. This method, however, was never entirely satisfactory, as it was practically impossible to obtain uniform results, largely because of the human factor. As is almost invariably the practice with hand firing, a fireman would fire heavily at infrequent intervals rather than putting in a small charge of coal at regular intervals. Such firing made it very difficult to maintain an even temperature and also required an excessive amount of fuel.

Because of the uneven fuel bed and the blanketing effect of the fresh coal when thrown on the fuel bed, combustion above the fuel bed was incomplete. There was not enough air to mix with the volatile gases to complete combustion in the furnace proper, so that these stratified gases would pass through the still and combustion would not be completed until there was sufficient air obtained at the top of the stack. In a plant of this type the flame at the stack top constituted a fire hazard which it was extremely desirable to eliminate.

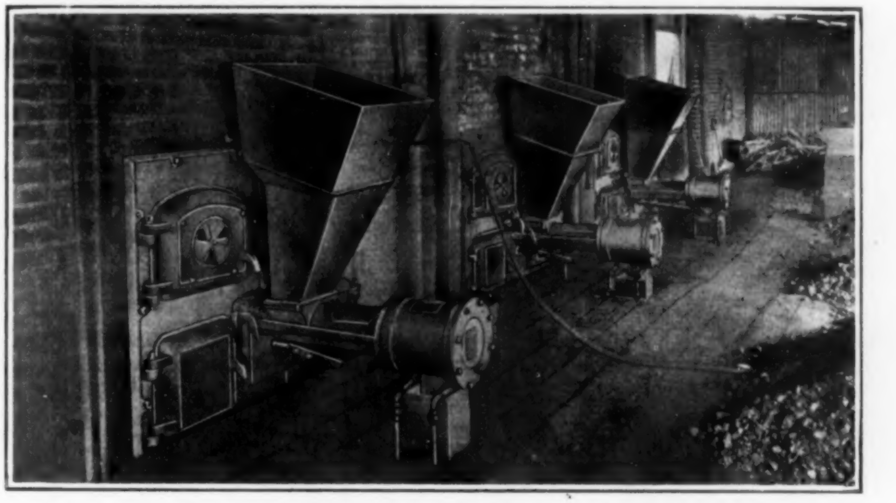


Fig. 2—Battery of Three Stoker-Fired Furnaces Applied to Stills

The stoker is of the underfeed type. The still does not consume much coal, so the stoker hopper is filled by hand. Coal from this hopper passes into the ram case underneath and is forced from there by a steam operated piston into the fire.

Stokers were in use in the boiler plant, so it was felt that if stokers were applied to these stills the troubles mentioned would be eliminated. The maximum coal consumption on each still was only 300 lb. per hour, the average being from 200 to 250 lb. Because of the comparatively small amount of coal used there was some question whether a stoker of this small capacity would prove a paying investment in the amount of coal saved. However, the stokers, which have now been in operation for 2 years, have made an average saving in fuel over hand-fired conditions of 25 per cent, which makes them a good investment from the fuel-saving standpoint as well as the elimination of other troubles.

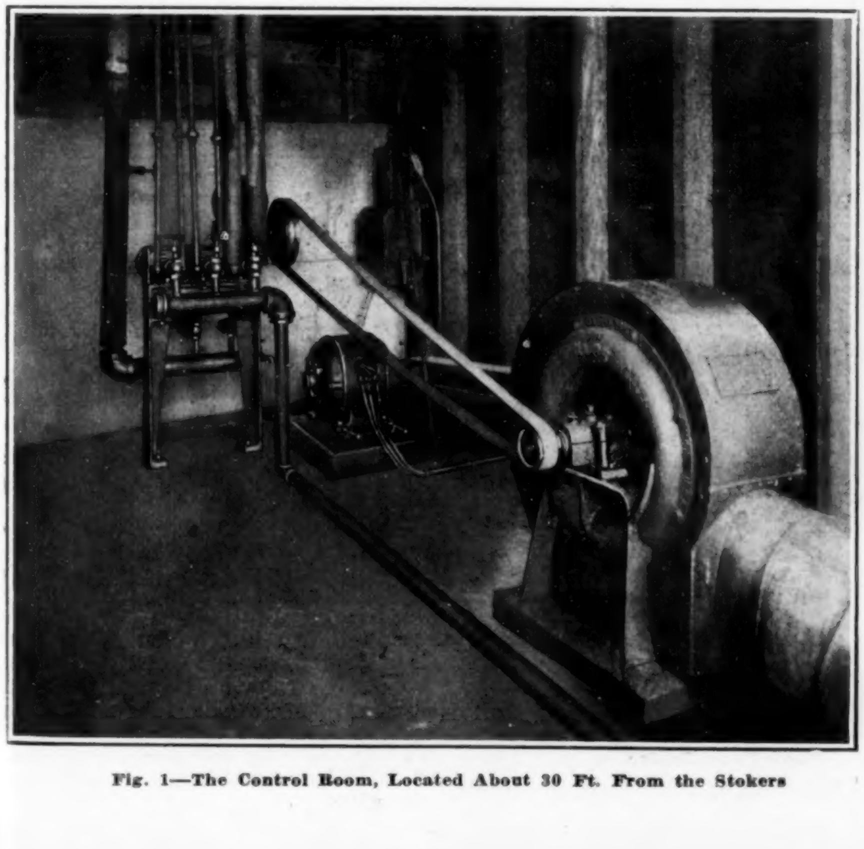


Fig. 1—The Control Room, Located About 30 Ft. From the Stokers

As the coal consumption per day is not large, the coal is fed to the stoker hoppers by hand, then passes into the ram case and is forced into the furnace by a steam-operated piston. The pusher rod moves with the ram to carry the coal forward in the retort and thus secures an even distribution of the fuel in the furnace. The stoker is of the underfeed type, the coal being forced into the furnace from underneath the fuel bed and gradually moving upward and outward past the air ports toward the side walls. As the green coal works up to the zone of intense heat at the top of the fuel bed the volatile gases are entirely driven off, so that combustion is completed within the furnace proper, thus eliminating any trouble with smoke or flame at the top of the stack.

The forced draft fan is of sufficient size to furnish air to the three stokers and is furnished by the Clarage Fan Co. Stokers and Cole automatic valves are furnished by the Sanford Riley Stoker Co., this type of stoker being known as the Industrial Furnace Stoker. As will be noticed, the same motor drives the forced draft fan and the bank of three Cole automatic valves. One of these valves is supplied for each stoker, its purpose being to regulate the amount of coal fed to each stoker. Each Cole valve has adjustment for eight different rates of

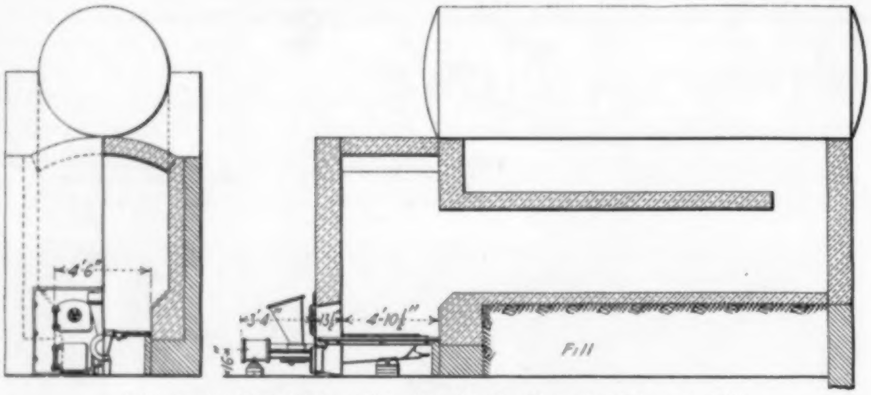


Fig. 3—Sectional View Showing Application of Stoker to Still

coal feed, so that it may be set at any point by the operator to meet special fuel conditions to secure best results. However, the proper adjustment of coal feed can usually be determined soon after the furnace has been started up and this adjustment may be maintained indefinitely. As only 4 lb. of coal per stroke is fed, an even firing condition is maintained. Air is controlled by a damper for each stoker, so that the operator is always able to maintain an even temperature. This last feature is of material assistance to the chemist, as he is then assured that the process he has recommended is being followed in regard to maintaining the proper heating conditions.

Diesel Engine

To fill the demand of industry for Diesel type oil engines in the smaller sized units having simplicity of design and ease of accessibility and repair, the Foos Gas Engine Co., Springfield, Ohio, has recently placed on the market its Type "R" engine.

This engine, shown in the accompanying cut, is of the single acting type. The base has deep cross-girders joining those at the side which form the seat for support of the base on the foundation, the seats for the main bearing shells being located in these cross-girders, bringing the crankshaft with its working forces close to the point of support. These main bearings are bronze lined with babbitt. They can be removed without lifting the crankshaft. The housing is of the box type. Transverse ribs from the top of the housing merge into the sides, forming a column of T section with a wide flange at the foot, thus providing a means of securing the housing to the base plate directly over the girders supporting the main bearings, transmitting the operating stresses directly to the base. The doors in the housing are hinged and fastened with latches, permitting easy access.

The connecting rod is of forged steel with marine type crank pin bearings secured by four bolts. The piston pin is steel in a bronze bushing. It is keyed and locked in position but allowed free movement for expansion and contraction. Pistons are of the trunk type with six pressure rings and two wiper rings. There is a baffle cast in the piston to prevent oil vapor from the housing coming in contact with the heated piston head, coking, and then dropping into the base, fouling the lubricating oil.

The cylinders are fitted with renewable liners, with an easily renewable packing ring at the base. The outer walls of the cylinder jacket are extended above the top of the liner and the inlet and exhaust manifolds are secured to the jacket, permitting removal of the cylinder head without moving the manifolds. Inlet and exhaust valves are dual, carried in cages. The seats are separate castings, valves, seats and other parts being interchangeable.

The governor is of the centrifugal type. It is fully inclosed, thus insuring good lubrication and protecting the operator; but the casing may be easily removed. Lubrication is by force feed mechanical lubricator.

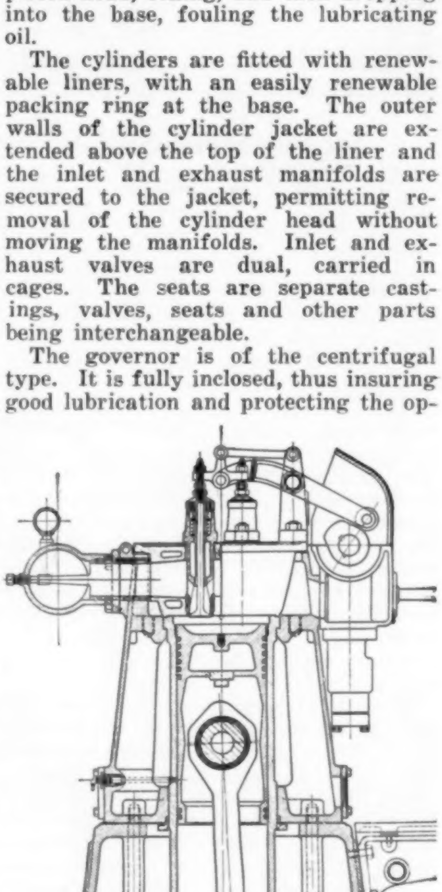


Fig. 2—Section of One Cylinder and Crankcase

This shows the interior construction of the new Diesel type engine as described in the accompanying article.

The engine is started with low-pressure air. California crude and Kentucky crude have been used as fuels for this engine with success, among a wide range of fuel oils that have given good results on test. Fuel consumption is slightly less than 0.4 lb. per brake horsepower-hour. Guarantees of 0.45 lb. per b.hp.-hr. at full and three-quarter load and 0.50 lb. per b.hp.-hr. at half load with any commercial crude or fuel oil produced in the United States are given.

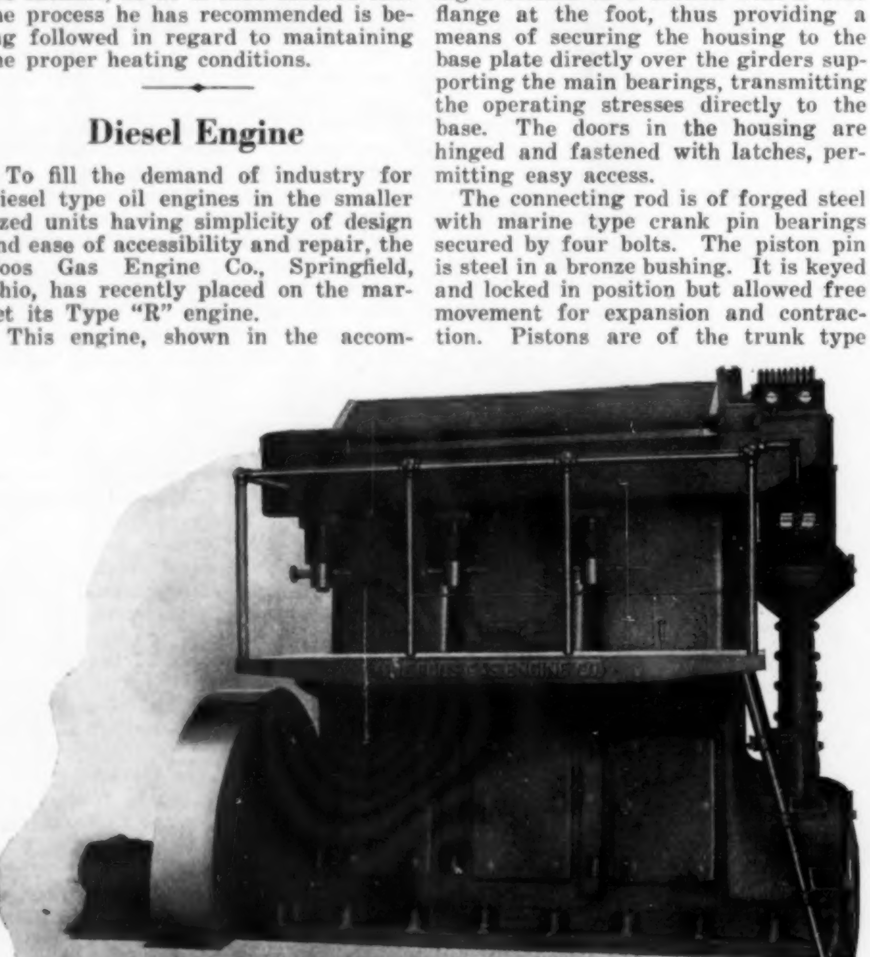


Fig. 1—View of the New Foos Diesel Type Engine

This picture plainly shows the simplicity and accessibility of design that the maker of this engine claims for it.

U. S. Patents Issued Dec. 30, 1924

Means for Transporting Pipe Sections of Large Diameters. Samuel C. Curriden, Clarksboro, N. J.—1,520,699.

Machine for Smoothing Curved Surfaces. Gustav Edward Ericsson, Ford City, Pa., assignor to Pittsburgh Plate Glass Co. — 1,520,703.

Electrode of Accumulators. Otto Schneider, Dresden, Germany.—1,520,724.

Process for Purifying Gases. Joseph A. Shaw, Pittsburgh, Pa., assignor to the Koppers Co., Pittsburgh, Pa.—1,520,726.

Process of Coating Ferric Articles With a Metallic Protective. George K. Thompson, Summit, and Joseph Eckert, Jr., Maurer, N. J., assignors to Hoyt Metal Co., St. Louis, Mo.—1,520,731.

Process of Coating Ferric Articles With a Metallic Protective. George K. Thompson, Summit, and Joseph Eckert, Jr., Maurer, N. J., assignors to Hoyt Metal Co., St. Louis, Mo.—1,520,732.

Bath for Heat-Treating Metals. Arthur E. Bellis, New Haven, Conn., assignor to the Bellis Heat-Treating Co., New York, N. Y.—1,520,744.

Process for the Recovery of Petroleum. Wilhelm Horwitz, Berlin, Germany. — 1,520,752.

Channel Oven. Heinrich Koppers, Essen-Ruhr, Germany, assignor to the Koppers Development Corp., Pittsburgh, Pa. — 1,520,757.

Plate-Glass-Polishing Machine. George W. Oakes, Crystal City, Mo., assignor to Pittsburgh Plate Glass Co.—1,520,766.

Centrifuge. Zeno Ostenberg, San Jose, Calif., assignor to the Caltex Co., San Jose, Calif.—1,520,767.

Oil-Heating Furnace and the Like. George L. Prichard and Herbert Henderson, Port Arthur, Tex., assignors to Gulf Refining Co., Pittsburgh, Pa.—1,520,771.

Filter Screen. Alexander T. Stuart, Toronto, Ont., Canada.—1,520,781.

Apparatus for Manufacturing Sheets and Other Articles From Plastic Materials. Samuel Scott Wilson, Meyerton, Transvaal, South Africa.—1,520,791.

Refractory Alloy for Wires and Rods. Frederick W. Zons, New York, N. Y. — 1,520,794.

Manufacture of Vegetable Charcoal. Leonard Hugh Bonnard, London, England. —1,520,801.

Process and Apparatus for Making Oil Gas. Charles R. Burke, Tulsa, Okla., and Thomas F. Hintze, Arrowchar, N. Y., said Burke assignor of his right to Louise P. Burke, Tulsa, Okla.—1,520,804.

Process of Abstracting Gases From Water by Means of Metallic Filters. Paul Kestner, Boulogne-sur-Seine, France.—1,520,823.

Measuring and Integrating Mechanism. Charles C. Lauritsen, Cleveland, O., assignor, by mesne assignments, to the Swartwout Co., Cleveland, O.—1,520,873.

Process of Making Decorated Leather Substitute and the Product Thereof. Henri A. Lindsey, Brandywine Hundred, Del., assignor to E. I. du Pont de Nemours & Co., Wilmington, Del.—1,520,877.

Process of and Apparatus for Oxidizing Carbon Compounds. Forrest J. Rankin, St. Louis, Mo.—1,520,885.

Separator for Electric Batteries. Virgil B. Sease, Parlin, N. J., assignor to E. I. du Pont de Nemours & Co., Wilmington, Del.—1,520,889.

Semi-Refractory Heat-Insulating Material and Method of Making the Same. Clark S. Teitsworth, Lompoc, Calif., assignor to the Celite Co., Los Angeles, Calif. — 1,520,893.

Salt and Method of Purifying the Same. Victor Yngve, Niagara Falls, N. Y. — 1,520,920.

Insecticide. William S. Baldwin, Houston, Tex.—1,520,924.

Check Filler or Surfacer for Refinishing Varnished and Like Articles. Eugene T. Craine, Los Angeles, Calif.—1,520,934.

Process for the Manufacture of Sealing Caps and for Applying Them Onto the Vessels to be Sealed. August Adolf Dulitz, Hirschberg, Germany.—1,520,940.

Method of Separating Oils. Ernst M. Johansen, Philadelphia, Pa., assignor to the Atlantic Refining Co., Philadelphia, Pa. — 1,520,953.

Floating Deck or Roof for Liquid Storage Tanks. John H. Wiggins, Bartlesville, Okla.—1,520,991.

Electric Furnace. Clarence A. Boddie, Pittsburgh, Pa., assignor to Westinghouse Electric & Manufacturing Co.—1,520,999.

Temperature Control for Electrolytic Cells. Porter H. Brace, Pittsburgh, Pa., assignor to Westinghouse Electric & Manufacturing Co.—1,521,002.

Resistor for Electric Furnaces. George M. Little, Pittsburgh, Pa., assignor to Westinghouse Electric & Manufacturing Co. — 1,521,028.

Mixing and Agitating Device. Noble L. Moore, Mitchell, Ind.—1,521,038.

Mixing Machine. Alexis D. Parker, Villa Nova, Pa., assignor to American Briquet Co., Philadelphia, Pa.—1,521,044.

Coated Airplane Cloth and Process of Making Same. Theodore Francois Tesse, Paris, France, assignor to Société Nauton Freses & de Marsac, St. Ouen, France, and Theodore Francois Tesse, Paris, France.— 1,521,055.

Composition for Coating. Theodore Francois Tesse, Paris, France.—1,521,056.

Process for Separating Gas Mixtures Under Pressure. Rudolf Ferdinand Mewes and Rudolf Karl Eduard Mewes, Berlin, Germany.—1,521,115.

Coke Oven. William H. Pavitt, Brooklyn, N. Y., assignor of one-third to Louis Wilputte and two-thirds to Alice A. Wilputte, both of New Rochelle, N. Y.—1,521,123.

These patents have been selected from the latest available issue of the "Official Gazette" of the United States Patent Office because they appear to have pertinent interest for "Chem. & Met." readers. Complete specifications of any United States patent may be obtained by remitting 10c. to the Commissioner of Patents, Washington, D. C.

Process for the Preparation of Meat Powders. William Frederick Remus, Rangataua, New Zealand, assignor of one-sixth to Alexander Edmund Macredi, one-sixth to Charles Frederick Cork, three-twelfths to Alan Mackenzie McNeill and three-twelfths to William John Abbott, all of Auckland, New Zealand.—1,521,127.

Roofing Element. Thomas Robinson, Babylon, N. Y., assignor to Anaconda Sales Co., Delaware.—1,521,128.

Process and Apparatus for Utilization of the Combustion Gases From Rotary Cement-Burning Kilns. Einar Ronne, Copenhagen, Denmark, assignor to F. L. Smidth & Co., New York, N. Y.—1,521,129.

Liquefaction of Gases. Claude C. Van Nuys, Cranford, N. J., assignor to Air Reduction Co., Inc.—1,521,138.

Evaporating and Condensing Apparatus. Edward Odon Benjamin, Newark, N. J., assignor to International Oxygen Co.— 1,521,147.

Lining for Ball Mills. William Matthew Barker, Canton, O.—1,521,169.

Composition Material. William W. Christmas, Ridgefield Park, N. J., assignor, by direct and mesne assignments, to Arista Manufacturing Co.—1,521,174.

Monazo Dyes Containing Two Hydroxy-naphthalene Nuclei. Fritz Straub, Basel, and Herman Schneider, Richen, near Basel, Switzerland, assignors to Society of Chemical Industry in Basle, Basel, Switzerland.—1,521,206.

Kiln Car. Philip d'H. Dressler, Zanesville, O., assignor to American Dressler Kilns, Inc., New York, N. Y.—1,521,216.

Grinding Mill. Johan S. Fasting, Valby, near Copenhagen, Denmark, assignor to F. L. Smidth & Co., New York, N. Y.— 1,521,217.

Process and Apparatus for Drying. Robert H. Wyld, Garden City, N. Y.— 1,521,223.

Poker Mechanism for Gas Producers. Reinhardt Daae, Pittsburgh, Pa.—1,521,231.

Feeding Means for Gas Producers. Reinhardt Daae, Youngstown, O.—1,521,232.

Refining of Petroleum Oil. Edgar M. Clark, New York, N. Y., assignor to Standard Developing Co.—1,521,278.

Art of Refining Oils. Sterling H. Diggs, Whiting, Ind., assignor to Standard Oil Co., Whiting, Ind.—1,521,282 and 1,521,283.

Method and Apparatus for Drawing Sheet Glass. John C. Henderson, New York, N. Y., assignor to the Libbey-Owens Sheet Glass Co., Toledo, O.—1,521,294.

Dry Cell. Homer D. Holler, Leonia, N. J., assignor to Diamond Electric Specialties Corp., Newark, N. J.—1,521,295.

Reversing Apparatus for Heating Furnaces. George H. Isley, Worcester, Mass., assignor to Morgan Construction Co., Worcester, Mass.—1,521,298.

Method of Treating Water. John R. McDermet, Jeannette, Pa., assignor to Elliott Co., Pittsburgh, Pa.—1,521,306.

Means for Opposing the Discharge of Acid-Laden Air. Cornelius Ambruster, Roslyn, Pa.—1,521,348.

Method of Making Oilproof Concrete Bodies. Julius Marcusson, Lichterfelde, near Berlin, Germany, assignor to Theo. H. Gary, New York, N. Y.—1,521,384.

Device for the Production of Compressed Oxygen From Liquid Oxygen. Adolf Messer, Frankfort-on-the-Main, Germany. —1,521,385.

Combination Open and Muffle Kiln and Method of Operating the Same. Harry M. Robertson, Cleveland, O., assignor to American Dressler Tunnel Kilns, Inc., New York, N. Y.—1,521,392.

Ball Mill. John R. Ball, Durango, Colo. —1,521,418.

Horizontal Sifter for the Manufacture of Paper Pulp and Cellulose With a Screen Submerged in the Aqueous Paper Pulp. Rudlof Pawlikowski, Gorlitz, Germany.— 1,521,469.

Distillation of Tar and the Like. Sigurd Walfrid Albert Wikner, Newcastle-upon-Tyne, England, assignor of one-eighth to Newcastle-upon-Tyne and Gateshead Gas Co., Newcastle-upon-Tyne, England.— 1,521,490.

Composition for Use in the Reproduction of Line Documents. Jean Dorel, Nice, France.—1,521,509.

Fumigant and Process of Fumigation. Harry W. Houghton, Glen Echo, Md.— 1,521,537.

Method of Making Carbons. Yoshiho, Inada, Takaw, Formosa, Japan.—1,521,541.

Method of Producing Chemical Reactions by Action of Heat. John Stanley Morgan, London, England.—1,521,549.

Bracing Apparatus for Fireproof Tanks. Wilson Sylvester Huff, Oklahoma City, Okla.—1,521,555.

Method of Preparation of Aliphatic Arsenical Derivatives From Acetoarsenious Anhydride. Carl Oeschslin, Ablon, France. —1,521,560.

Apparatus for Tapping Liquids Such as Paint From Receptacles. Max Rogler, Ratingen, Germany.—1,521,564.

New Publications

Bureau of Mines

"Oxidation of Zinc Vapor by Carbon Dioxide," by *B. M. O'Harra*. Tech. Paper 336.

"Estimation of Underground Oil Reserves by Oil-Well Production Curves," by *Willard W. Cutler, Jr.* Bull. 228.

Bureau of Standards

"Theory and Performance of Rectifiers," by *H. D. Holler* and *J. P. Schrodt*. Tech. Paper 265.

"Ultra-Violet Reflecting Power of Some Metals and Sulphides," by *W. W. Coblentz* and *C. W. Hughes*. Scien. Paper 493.

Other Publications

"Heat Insulators," 58 pages with 16 text figures. Copies can be obtained from His Majesty's Stationery Office, Adastral House, Kingsway, W.C.2, London, England. Price 2s. net. Postage extra.

United States Department of Agriculture Bulletin 1280, "The Computation of Fertilizer Mixtures From Concentrated Materials," by *Albert R. Merz*.

University of Illinois Bulletin 144, "Power Studies on Illinois Coal Mining," by *Arthur J. Hoskin* and *Thomas Fraser*.

News of the Industry

Summary of the Week

State and Treasury Departments negotiate to modify section of tariff act which provides penalties against foreign producers who refuse to furnish data on production costs.

Underwood Muscle Shoals bill wins in Senate committee of the whole.

German potash producers assail Kali Syndicate for entering into agreement with Alsatian producers.

L. W. Wallace elected president of Eyesight Conservation Council of America and plans laid for better vision in education and industry.

Representatives of industrial consumers of alcohol protest against passage of the Cramton bill before Senate subcommittee.

American Engineering Council appoints committee to study the aircraft situation.

Negotiations Under Way to Abrogate Section 510 of Tariff Act

Would Eliminate Penalties Against Producers Exporting to This Country Who Refuse to Furnish Production Costs

As THE RESULT of vigorous protests, expressed formally or informally by at least five foreign governments through diplomatic channels, negotiations are in progress between the State and Treasury Departments regarding the operations of the latter under section 510 of the 1922 tariff act, which authorizes the Secretary of the Treasury to forbid entry of merchandise from any foreign producer who refuses to permit inspection of his books to ascertain information regarding market value or classification, with the probability that this section will become a dead letter. Section 510 appears in the 1922 tariff act for the first time in tariff history of the United States. It was designed as a penalty against foreign producers exporting to the United States who refused adequate information on which duty could be assessed. In cases where no foreign or export value exists or can be ascertained, the Treasury Department seeks costs of production in order to calculate value, and it is in efforts along this line that the complications have arisen.

Most Foreign Producers Open Books

All cases at issue have arisen because of efforts to assess duty. Considerable of the resentment abroad, however, is said to be due to various investigations undertaken by the Tariff Commission in efforts to ascertain costs of production in cases arising under the flexible tariff. Most foreign producers have opened their books to the commission's agents on the theory that costs are generally understood to be lower abroad than actually is the case and that their cases would be helped by opening their books. Some foreign manufacturers, however, have declined to give the Tariff Commission's agents any information, among them Norwegian producers of sodium nitrite, on which the duty recently was increased. In these cases, the Tariff Commission has no penalty provision, excepting that the foreign producers assume the risk of having their costs estimated at a higher figure than actually may be the case.

Six Exclusion Orders Issued

The Treasury Department has excluded the products of six foreign firms under section 510. Of these, only one order still stands, that against products of the Singer Manufacturing Co. of Scotland, which is affiliated with the sewing machine manufacturing company of that name in the United States. The Scotch company, which makes machine parts for its parent concern and sells to no other, refused to open its books. After a year's negotiations, an order was issued excluding its products, and this still is in effect. Four orders were issued against Portuguese firms manufacturing madeira lace. All these were rescinded when the books were opened for inspection of American customs agents.

Last October an order was issued excluding products of the J. D. Riedel Aktiengesellschaft Abt. Tretalinwerke, Berlin-Britz. It was rescinded Dec. 10. An importation of hexaline, a coal-tar intermediate classified in paragraph 27 as non-competitive, was entered at Boston and special information was sought as to its value. The German firm offered to open its books, but declined to permit figures to be copied. Without written figures, the calculations could not be made and the order under section 510 was issued. Shortly thereafter the firm opened its books fully and the order was recalled. It developed subsequently that this case arose because of a misunderstanding, as there is a definite foreign market value of hexaline from which the calculations could have been made.

Great Britain, France, Norway, Denmark and Sweden are understood to have entered protests with the State Department regarding the operations of section 510. No orders have been issued affecting products of any of these excepting Great Britain.

International Complications Feared

The situation is regarded as possessing such potentialities for international complications that it is understood the State Department is seeking to have the Treasury Department practically nullify section 510. This would add to the dead letters of the 1922 tariff act, among others of which are the extreme penalty clauses of section 316, relating to unfair practices, and section 317, relating to discriminations, both of which are among the flexible provisions under the authority of the President and the Tariff Commission and both of which would permit products to be excluded as retaliation in extreme cases. The Tariff Commission has not operated under either of these sections, beyond a few reports of discriminations that always were made under its ordinary duties, and two investigations of alleged unfair practices, neither involving extreme measures. Section 315 of the flexible tariff, the one providing for changes in duties to equalize costs of production, has no penalty clause directly against foreign firms which decline to open their books.

Industrial Users of Alcohol Protest Against Cramton Bill

Senate Subcommittee Hears Representatives of Trade Associations, Technical Societies and Individual Firms

VIGOROUS protests against enactment of the Cramton bill to create a Prohibition Bureau within the Treasury Department, thus removing the present Prohibition Unit from the jurisdiction of the Bureau of Internal Revenue, were voiced by representatives of many industrial consumers of alcohol when hearings on the measure, which has passed the House, were resumed Jan. 7 before a subcommittee of the Senate Judiciary Committee.

Without exception, spokesmen for trade associations, technical societies and individual firms declared their belief that further vexations for industrial alcohol consumers would result if the Prohibition Unit were made an independent bureau. Prior to the holiday recess in the hearings it had been suggested that if the bill were recommended for passage an amendment be included to create a board of appeals to which business interests might carry cases in which they dissented from rulings of the proposed bureau without the expense of money and time necessary to going into court for relief.

Legitimate Business Hampered

In testifying at the renewal of the hearings, J. A. Hardy, of the Larkin Co., Inc., Buffalo, speaking for that firm and for the American Manufacturers of Toilet Articles, urged earnestly that nothing further be done to hamper and embarrass business in the legitimate use of alcohol. The law is administered now in relation to industrial users of alcohol as if each were a potential bootlegger, he said, and seldom with an atmosphere of sympathetic understanding of business needs. Some of the inspectors of the Prohibition Unit, Mr. Hardy said, do not understand their business and there is constant danger that an innocent firm may get into trouble because of an erroneous report. Some of the inspectors, he said, appear to have "their hands out" awaiting "something to be slipped them" or the offer of a job to disclose supposed secrets of trade which they have picked up at other plants during inspections. He expressed the fear that if the Cramton bill were enacted more inexperienced inspectors would be employed and various difficulties would be increased.

B. G. Slaughter, assistant to the president of the Tubize Artificial Silk Co., Hopewell, Va., likewise expressed the fear that inexperienced inspectors would be sent out if the bill passes. This company manufactures by a secret process which it guards closely, he said, and does not wish to run any risks of new men being sent to look over the plant by any agency.

Among others who testified in opposition to the Cramton bill were Dr. M. C. Whitaker, of the U. S. Industrial Alcohol Co.; Dr. W. J. Schieffelin, National Wholesale Druggists Association; F. S. Rogers, president of the Flavoring Extract Manufacturers Association; Dr. C. L. Reese, representing the Manufacturing Chemists Association and the du Pont company; Dr. Martin H. Ittner, chairman of the alcohol committee of the American Chemical Society and also representing Colgate & Co.; P. S. Rigney, representing the Synthetic Organic Chemical Manufacturers Association; J. D. Steele, representing shoe polish manufacturers; and Levi Cooke, representing distillers and medicinal whiskey interests, the last-named criticizing technical features of the bill.

Truth With a Vengeance!

I am a chemical engineer by profession working at the job of building up a chemical industry in the United States. I am opposed to the passage of the Cramton bill or any similar legislation which seeks to confer upon the prohibition organization unrestricted power over the great industries producing and using alcohol as a chemical raw material.

The issue raised by the Cramton bill is, as a matter of principle, whether or not the industries of this country, practically all of which directly or indirectly depend upon alcohol—the chemical—are to be dominated, controlled, restricted, experimented with or possibly exterminated by the concentration of unwarranted administrative power in a group created for the declared purpose of enforcing a social reform, and whether or not it is sound business judgment to increase the scope and the power of a 4-year-old organization which has demonstrated beyond any question of doubt a gross ignorance of the needs and requirements of industry; which has shown an unprecedented inefficiency in administering those functions which bring it into contact with industry; which has proved by its various rulings and edicts a lack of practical knowledge of good business principles, together with a disregard for established laws; and which officially admits a high percentage of moral delinquencies among its subordinates.

MILTON C. WHITAKER,
President, U. S. Industrial Chemical Co.

College Scientists Elect Officers

At a meeting of the Science Section of the Association of Colleges and Preparatory Schools of the Middle States and Maryland on Nov. 28 and 29, the following officers were elected: President, W. B. Meldrum, professor of chemistry, Haverford College; vice-president, W. J. Hancock, Erasmus Hall High School, Brooklyn, N. Y.; secretary-treasurer, Miss Elizabeth W. Towele, the Baldwin School, Bryn Mawr, Pa.

Muscle Shoals Fight Near End in Senate

Underwood Measure Is Substituted for the Norris Bill in Committee of the Whole

The end of the Muscle Shoals controversy in the Senate seems to be in sight. On Thursday, by a vote of 48 to 37, the Senate, sitting in committee of the whole, substituted the Underwood measure for the Norris bill. The Underwood bill, as now amended, provides that President Coolidge shall have until Sept. 1 to lease the property and if he cannot lease it on favorable terms, a scheme of federal operation shall be devised.

At the time of going to press this was the situation:

By unanimous consent amendments may be proposed to the bill before final roll call. Several amendments are pending, including one by Senator Wadsworth proposing a commission headed by the Secretary of War to make a survey of the Muscle Shoals project and recommend the most advantageous system for its management and development.

Before the final vote on the Underwood bill, a vote on the Norris bill, providing for federal operation, will be taken.

In summing up before the vote on Thursday. Senator Underwood said: "The real issue is one of national defense primarily and of producing cheap fertilizer secondarily."

Senator Norris said that the Underwood bill, if enacted, would prove to be one of the greatest "lame duck refugees" ever carried through Congress.

Preliminary Arrangements for Baltimore Meeting, A.C.S.

A meeting of the Council at 2:30 p.m. April 6 will be the opening session of the spring meeting of the American Chemical Society in Baltimore. If the business in hand requires, the Council will meet again in the evening.

Headquarters will be at Hotel Emerson, where registration booths will be opened early on the morning of April 7. The fee for this meeting will be $3.

The first general meeting will convene at 11 o'clock April 7, in the War Memorial Building, near the Emerson. The afternoon of that day will be devoted to divisional symposiums. Rooms for that purpose have been secured at Hotel Emerson, at the Southern Hotel and at the Engineers Club.

Sectional meetings on the morning of April 8 will be conducted at Johns Hopkins University. Lunch will be served at the university. Industrial excursions will occupy all of Wednesday and Thursday afternoons. Divisional meetings at Johns Hopkins will continue throughout the day Friday.

The public meeting is to be held Wednesday night at the War Memorial Building. The dinner, to be followed by dancing, is scheduled for Thursday evening.

Hotel reservations are to be made through William H. Parker, care Hotel Emerson.

Washington News

Government Upheld in Rejecting Bids for Nitrate of Soda

The Supreme Court on Jan. 5 affirmed the decision of the Court of Claims in denying the claim of the Erie Coal & Coke Co. against the United States Government for $1,200,000 because its bid for 29,000 tons of sodium nitrate was not accepted by the Secretary of War. The 29,000 tons was part of 40,000 tons offered at auction in April, 1922. The offer of sale stipulated that the Secretary might rescind the contract at any time before August and recall the nitrate. The bids were rejected by the Secretary as insufficient. The Erie company claimed $1,200,000 as the difference between the $711,000 it bid for the three lots awarded it by the auctioneer and the $1,900,000 it claimed as the market price for which it could have sold the 29,000 tons. The Supreme Court held that the Secretary was not obliged to execute the contract and then rescind it, as the sale terms provided, if dissatisfied with the bids, and that the company held no just claim for compensation.

Engineering Council to Study Aircraft

Appointment of a committee to study the whole aircraft situation is announced by the American Engineering Council. The chairman is Joseph W. Roe, professor of industrial engineering in New York University. The committee, it was stated by the president of the Council, ex-Governor James Hartness of Vermont, plans to inquire into all phases of air navigation, particularly air mail, commercial flying, and national defense. A large group of related questions would, he said, be taken up. The economic and industrial possibilities of aircraft were described as a central problem. The most feasible air routes from an economic standpoint will be sought out, and special studies made of topographic and climatic conditions. The report of the committee will be submitted to the American Engineering Council, the findings, it is expected, serving as a guide to the Council's future policy in the field of aëronautics.

Professor Roe is a former president of the Society of Industrial Engineers, and came to New York University from the faculty of the Sheffield Scientific School of Yale University. He is a former member of the American Engineering Council, and during the war was stationed at McCook Field, Dayton, Ohio.

Other members of the committee are: Dr. W. F. Durand, president of the American Society of Mechanical Engineers, professor emeritus in Leland Stanford University and member of the National Advisory Committee on Aëronautics; Prof. E. P. Warner, Massachusetts Institute of Technology, chairman of the Aëronautics Division of the American Society of Mechanical Engineers; George William Lewis, executive officer of the National Advisory Committee on Aëronautics, Washington; Starr Truscott, design expert, Naval Bureau of Aëronautics, Washington; William B. Stout, airplane manufacturer, Detroit; Charles M. Manly, New York; Colonel A. T. Perkins, St. Louis; Howard E. Coffin, Detroit; G. C. Spaulding, Spokane, Wash.

Japan Is Large Importer of Sulphate of Ammonia

A report from the office of the commercial attaché at Tokyo states that one of the leading fertilizers imported into Japan is sulphate of ammonia, which is used in connection with rice cultivation. Japan's sulphate of ammonia factories are equipped to supply about half of the empire's requirements for this commodity, as shown by the following table of imports and production for the years 1920 to 1922 inclusive:

	Production (Piculs)	Imports (Piculs)	Consumption (Piculs)
1920	1,324,412	1,210,603	2,562,015
1921	1,566,742	1,320,409	2,887,151
1922	1,393,714	1,550,376	2,944,190

Production statistics for years later than 1922 are unavailable, but imports in 1923 were heavy and probably again exceeded the production. The United States has always been an important supplier of sulphate of ammonia to the Japanese market, and in 1922 provided 89 per cent of the amount imported.

For the Japanese market it is essential that sulphate of ammonia be supplied as white as possible. The domestic product is pure white, and sulphate of a grayish tint does not sell except with the greatest difficulty. It is also customary to require that it contain at least 25 per cent of ammonia. The domestic ammonia is put up in bags containing 10 kamme (1 kamme = 8.26733 lb.), and prices are quoted per bag.

German Producers Say Potash Agreement Favors Alsatians

An internecine row has developed in the German potash industry. The Wintershall Konzern, which includes in its membership fifty-three potash-producing enterprises in Germany, has assailed the Kali Syndicate for its action in entering into an agreement with the Alsatian producers. The Kali Syndicate has sacrificed an advantage to which American consumers and other foreign buyers are entitled, the Wintershall contends. The latter organization contends vigorously that there is no justification for the agreement which protects the high producers in Alsace, when the low cost German properties are in a position to supply the entire demand.

The agreement, the Wintershall holds, has the immediate effect of greatly increasing the amount of Alsatian potash sent to America. The Wintershall is at a loss to understand how the Alsatian producers were able to outwit the Kali Syndicate in this deal when it was obvious that it meant the closing of many German works just at the time when it was most important to extend the use of potash by marketing it at the lowest possible price.

In 1923 the fifty-three enterprises making up the Wintershall merger sold 315,000 tons of potash, as compared with sales of 886,000 tons by the Kali Syndicate. Twenty-three of the operations included in the Wintershall combine are now closed down.

Sixteenth Supplemental List of Dye Standards

The Treasury Department has issued its sixteenth supplemental list of standards of strength of coal-tar dyes for the purpose of assessing the specific duty of 7 cents per pound, which is applied in the proportion that the strength of the import bears to the strength of similar commercial importations prior to July 1, 1914. This supplemental list adds eight dyes to the standards and names seven others for similitude to dyes previously listed.

Naval Stores Industry Reduces Waste in Production

Waste and abuses gradually are being eliminated by producers of rosin and turpentine as a result of the demonstration work being conducted by the Bureau of Chemistry at Southern turpentine stills. The greater part of naval stores production is the aggregate of the output of numerous small plants. Wasteful and improper methods grew up gradually. In some instances 3 gal. of turpentine per charge was lost because of faulty methods.

Hearings on Trademark Bill

Joint hearings by the Senate and House patent committees will open Jan. 20 on the Lampert bill to regulate registration and use of trademarks. This bill, introduced last April, is an attempt to simplify the trademark laws and to provide more rigid penalties for infringements. In general, it is said this bill meets the approval of officials of the Patent Office.

German Caustic Potash Control

The recently formed sales organization of the German producers of caustic potash thus far seems to have accomplished little toward the stabilization of prices, but a sufficient proportion of production is controlled to insure ultimate influence over the price situation within certain ranges.

Active Call for German Bromates

In a sharp contrast with most chemicals, Germany reports a lively demand for bromine and bromates. This is due to demand from the United States, where the manufacture of ethyl gas has put a strain on the world's ability to produce these commodities.

Wallace Elected President of Eyesight Council

Plans Laid for Nation-wide Effort in Behalf of Better Vision in Industry

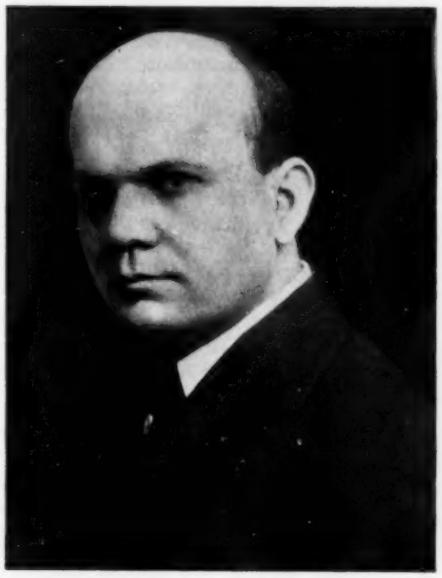
Lawrence W. Wallace of Washington, D. C., was elected president of the Eyesight Conservation Council of America at the annual meeting of the Council held in New York City on Jan. 5, when plans were laid for nation-wide effort in behalf of better vision in education and industry. Mr. Wallace is executive secretary of the American Engineering Council, and as vice-chairman directed the assay of waste made by the Hoover Committee on the Elimination of Waste in Industry.

Guy A. Henry of New York City was re-elected general director. He will be in active charge of the Eyesight Conservation Council's work in schools and factories. Research, it was announced, will be a major factor in the Council's activities during 1925.

R. M. Little of Albany, N. Y., director of the Bureau of Rehabilitation of the State Department of Education, was chosen a director. Secretary of Labor James J. Davis was named to the board of councillors. Other councillors chosen are:

John J. Tigert, U. S. Commissioner of Education; Sidney E. Mezes, president of the College of the City of New York; Arthur L. Day, director of the Geophysical Laboratories of the Carnegie Institution, Washington; Prof. Charles H. Judd, director of the School of Education, University of Chicago; Dr. W. S. Rankin, State Health Officer, North Carolina, Raleigh; Prof. Joseph W. Roe, School of Engineering, New York University; Prof. Thomas D. Wood, Teachers College, Columbia University; G. E. Sanford, Lynn, Mass., past president, American Society of Safety Engineers.

Nearly $300,000,000, according to a report just made public by the Council, is lost annually through industrial accidents due to defective lighting. On the basis of a recent survey of more than 91,000 accident records by the engineers of the Travelers Insurance Co., according to the report, the services of more than 100,000 workmen are removed from industry each year because of inadequate or improper lighting. This, it was declared, amounts to an annual loss to industry of more than 3,000,000 productive man-days. Marked progress in cutting down this waste was reported.



Lawrence W. Wallace

Of vision conditions in industry, the report said: "Careful investigations of large groups of employees in industrial plants and commercial houses show that fully 66 per cent have defective eyes. This condition is prevalent among any group of workers. The fact that it can be almost entirely remedied makes its existence inexcusable."

Newark Planning Big Exhibition of Leather Industry

Arrangements are being completed for a leather exhibition in Newark, N. J., to occupy the entire second floor of the new Museum Building, now in course of construction, to be completed early in the spring. The exhibit will be of comprehensive character, covering leather in industry in all phases, its uses, artistic and utilitarian possibilities, processes of manufacture, etc. It is said that the project is the largest of its kind ever attempted by an American museum. An intensive survey of the leather industry throughout the country has been in progress since October to serve as a preliminary source of data for the proposed exhibit as well as a guide to locate essential exhibition material. All branches of the industry are co-operating with the museum directors, including such organizations as the American Sole and Belting Leather Tanners, Tanners Council, New England Shoe & Leather Association, National Boot & Shoe Manufacturers Association and other bodies.

Sale of Chilean Nitrate Lands May Be Expected, Says Attaché

It will be recalled that the proceeds from the auction sale of Chilean nitrate lands held on Sept. 15 last amounted to 20,124,517.86 gold pesos of 18d., and that some of the lots originally announced were not put up for sale at that time.

Of the funds received from this source 10,000,000 gold pesos were used for financing the 1924 budget and another 10,000,000 gold pesos have been reserved for the service of certain loans. Thus there remains a balance of 124,517.86 gold pesos in the treasury from the proceeds of the sale.

In accordance with a decree issued by the Council of Government the above-mentioned balance is to be devoted to surveys of the unsold lots with a view to preparing them for sale in public auction, says the Commercial Attaché of Santiago, in a report to the Department of Commerce. So soon as these surveys have been completed, the date fixed for the sale will be announced. It is expected that the sale will attract considerable interest.

Trade Notes

Girard & Co., Inc., Mt. Vernon, N. Y., manufacturer of potashes, borax and polishes, has acquired the land and buildings formerly occupied by the Hawthorn Manufacturing Co., Bridgeport, Conn. The Girard company plans to move its entire business to Bridgeport and expects to start production by May 1.

The Texas Petroleum Co. of New Jersey, with $1,000,000 authorized capital, of which $500,000 is issued, has been organized as a subsidiary of the Texas Co. to operate as the exploration and producing subsidiary of the parent company in South America.

The Merrimac Chemical Co. has purchased the Anderson Chemical Co., Inc., of Wallington, N. J.

Fezandie & Sperrie of New York have been incorporated to make and deal in dyestuffs. Capital stock is $150,000 and incorporators are O. E. Sperrie, C. Schick and O. Beth.

The annual banquet and dance of the Paint, Oil & Varnish Club of New York will be held at the Hotel Plaza on Thursday evening, Jan. 15.

F. W. Fink, one of the founders of Lehn & Fink, manufacturers of pharmaceutical and chemical products, died at Fulda, Germany, on Dec. 31.

The Chemische Fabrik Griesheim Elektron has issued a denial, in Germany, that it is planning to operate an ammonia and oxygen plant in the United States.

Attractive Program for Steel Treaters in Cincinnati

The sixth sectional meeting of the American Society for Steel Treating will be held at the Hotel Sinton, Cincinnati, on Thursday and Friday, Jan. 15 and 16. Thursday will be devoted to technical sessions, one paper in the morning at 10 o'clock, and one in the afternoon, while in the evening an informal dinner meeting will be held. Friday will be devoted exclusively to visiting of plants in Cincinnati and vicinity, under the direction of the Cincinnati chapter.

A very high-grade program of papers has been prepared for this meeting and a large attendance is expected. The papers to be presented are as follows: "Sample Preparation for High Power Photomicrography," R. G. Guthrie, metallurgist, industrial gas department, Peoples Gas Light & Coke Co., Chicago; "High Tensile Strengths With Low Carbon Steels," R. H. Smith, vice-president, Lamson & Sessions Co., Kent, Ohio; "Wear and Wear Testing," G. W. Quick and S. J. Rosenberg, Bureau of Standards, Washington; "Gearing as a Medium for Industrial Power Transmission," O. N. Stone, assistant chief engineer, Van Dorn & Dutton Co., Cleveland; "Corrosion-Resisting Steels of the Iron-Carbon-Chromium and the Iron-Carbon-Chromium-Silicon Series," T. Holland Nelson, metallurgist, United Alloy Steel Corporation, Canton, Ohio.

Financial

A special meeting of stockholders of the Mathieson Alkali Works will be held on Jan. 21 to approve increase in shares from 130,000 to 200,000. The proceeds from the sale of the new stock will be used to improve the plants of the company

A report from Boston states that the National Leather Co. purchased and canceled during 1924 an additional $2,000,000 of its 5-year gold notes, due Nov. 15, 1925, leaving $7,000,000 outstanding.

S. Slater & Sons, Inc., woolen manufacturer, has increased capital from $1,100,000 to $2,200,000 by issuing 11,000 additional shares as a 100 per cent stock dividend. The company recently reduced its capital from $3,000,000 to $1,100,000 by canceling 19,000 shares of $100 par stock held in the treasury.

The New Jersey Zinc Co. has declared the regular quarterly dividend of 2 per cent, payable on Feb. 10.

Receivers of the Virginia-Carolina Chemical Co. last week were authorized to sell 125 shares of stock in the Independent Guano Co. of Greenville, S. C., at $265 per share. Receivers also were authorized to sell 110,170 shares of stock of the Southern Cotton Oil Co., Ltd., of London at 30s. per share, the purchasers to receive the latest dividend of the company.

International Safeguarding of Patents Being Considered

International measures for the safeguarding of patents and trademarks and the prevention of unfair trade practices are being considered by the American Section of the International Chamber of Commerce in anticipation of the meeting of the full committee on the protection of industrial property, which is to be held in Paris soon, and the discussion of the subject by the Economic Section of the League of Nations.

The American Section has announced the appointment to membership on its committee of Edward S. Rogers, of Chicago, chairman of a similar committee of the American Bar Association dealing with the same question. Mr. Rogers has returned from Europe, where he consulted a number of business men and public officials on the feasibility of the adoption of an international policy.

The question is of particular interest to the United States in view of the fact that this country is not a signatory to the Madrid convention which provides, through an international agency established at Bern, Switzerland, for the international registration of patents and trademarks. Neither is it a member of the League of Nations, which is considering the possibility of adopting practices applicable to all countries.

Whether the Treaty of Paris, of which the United States is a signatory and which is intended to afford international protection for industrial property, should be revised or whether a new plan should be devised by extending the Madrid convention to all countries are questions now being considered by the American Section of the International Chamber. It is expected that the International Chamber will formulate a policy approved by the business interests of the countries represented in its membership which will eventually be submitted to the League and the non-member governments for approval and adoption.

Kansas City Section, A.C.S., Reviews Year's Work

The annual meeting and election of officers of the Kansas City Section of the American Chemical Society was held at the Kansas City Athletic Club Saturday, Dec. 27. Dr. Elzia of Lawrence, Kan., was elected chairman of the section, and A. S. Barada, Kansas City, was re-elected as secretary and treasurer.

After the election the following members gave a short review of their subjects for the year 1924: Dr. H. P. Cady, "Physical Chemistry"; W. H. Leverett, "Acids and Heavy Chemicals"; H. E. Hancock, "Paint and Varnish Manufacture"; J. G. Hawthorne, "Oil Products"; C. J. Patterson, "Cereal Chemistry"; N. N. Dalton, "Chemical Prospects of the Kansas City Territory." In connection with the latter subject it was stated that a large solvent corporation would soon install a plant for production of solvents from corn refuse in Kansas City. Mr. Hawthorne featured the fact that the use of clays to carry down acid after treatment of oils will effect separation so that alkali can be dispensed with.

85 Per Cent of World's Rubber Footwear Made in Akron

Authoritative figures recently compiled covering rubber footwear production at mills in Akron, Ohio, show that the plants in that city are now manufacturing approximately 85 per cent of the world's supply of rubber boots, shoes and heels. It is pointed out that within the past year or two there has been a definite shift to eastern Ohio of this branch of the rubber industry from the New England states, which heretofore have taken first place in this direction. It is estimated that the total production of rubber boots and shoes in the Akron district in 1924 aggregated nearly 10,000,000 pairs; the B. F. Goodrich Co. alone has been running on a basis of about 30,000 pairs of such footwear per day. In the line of rubber heels, the gross production approximates 200,000,000, the largest producers being the Goodrich company, Goodyear Tire & Rubber Co., Firestone Tire & Rubber Co., Miller Tire & Rubber Co. and the Seiberling Tire & Rubber Co. The majority of these plants are arranging for expansion in their rubber footwear divisions, and it is estimated that the 1925 production will increase from 25 to 30 per cent over the 1924 figures.

Obituary

Horace Lemuel Wells

The Sheffield Scientific School of Yale University lost one of its oldest and most loyal professors in the death of HORACE LEMUEL WELLS, who died on Dec. 19, 1924. Professor Wells, born in 1855, received his early education in the public schools of New England and prepared for college at the New Britain High School in Connecticut. He was a graduate of the chemistry course in the Sheffield Scientific School, maintaining a very high rank in his undergraduate work, and was graduated with the class of 1877. During his early life Professor Wells was very active in the field of metallurgical practice, being connected formerly with industrial activities in connection with the Pennsylvania Laboratories at Altoona in 1879 and with the Colorado Coal & Iron Co. in Pueblo, Colo., for 4 years, 1880-84, when he returned to his alma mater in New Haven and accepted an appointment as instructor in analytical chemistry. He had been continually connected with Yale since that date and was retired as professor emeritus 2 years ago. Professor Wells was one who was recognized by all who were in intimate contact with the activities of the Sheffield Scientific School during its early growth as a professor of strong force in the class room and one who was abreast of the times in the presentation of his special subjects—analytical chemistry and metallurgy. A great many men who loved him and admired him for his kindness and assistance during their college career will greatly regret that men of his character and personality are slowly disappearing from our academic institution. Professor Wells was an excellent teacher, and only those who enjoyed the privilege of sitting in front of his lecture desk can make a true record of those fine qualities which endear a teacher to his pupils. He left impressions on many men who have made careers creditable to Yale as an institution, and he will long be remembered by those who knew him, and by his published works, as a man who led an honorable and useful life. He loved the institution that gave him his degree and always worked for its growth and scholastic advancement.

TREAT B. JOHNSON,
Professor of Organic Chemistry,
Yale University, New Haven, Conn.

FRITZ ACHELIS, president of the American Hard Rubber Co., New York, died at his home in that city on Dec. 23, aged 81 years, after a brief illness following a general breakdown. He had been president of the company since its organization in 1880. Mr. Achelis donated $30,000 to the Poppenheim Institute, College Point, L. I., in 1918, for the creation of two classes in practical mechanics, as a memorial to two former foremen of his company.

BENJAMIN F. BLANK of Winchester, Mass., a retired leather manufacturer, died at his local residence, Dec. 28, aged 66 years. He had been a member of the firm of Blank Brothers, with tan-

neries at Stoneham and Everett, Mass., retiring from active business about 6 years ago.

JOHN B. LOBER, of Philadelphia, Pa., president of the Vulcanite Portland Cement Co., died at his residence at Wynnwood, Dec. 21, aged 76 years. He had undergone a severe operation early in November, but was recuperating satisfactorily until a few days before his death. Mr. Lober was born in Camden, N. J., and was educated in the public schools and Peirce Business College. He had been a prominent figure in the cement industry for a great many years and was one of the organizers of the Portland Cement Association. Mr. Lober is survived by his wife and one son.

CALEB ADDISON MCCOLLUM, chief engineer of the Clairton By-Product Coke Works of the Carnegie Steel Co., Clairton, Pa., died at his home in Wilson, Pa., on Dec. 24, from a heart affection. Mr. McCollum was born Dec. 29, 1884, near Washington, Pa. He graduated in mechanical engineering from Carnegie Institute of Technology in 1910. Upon leaving school he entered the employ of the Carnegie Steel Co., with which organization he was associated until the time of his death.

NATHAN MILLER, president of Miller Brothers, Paterson, N. J., manufacturers of celluloid products, died on Dec. 21 as the result of injuries and burns received in a fire at the company plant a few days previous.

AUGUSTUS L. SMITH of Brookline, Mass., for many years active in the pulp and paper industry, died at his home, Dec. 20, aged 62 years. He was born at Salem, Mass., and was graduated from Wesleyan University, class of 1883. He was at one time connected with the Manufacturing Investment Co., which operated a number of pulp and paper mills in Maine and Wisconsin. From 1889 to 1913 he was associated with the Great Northern Paper Co., Madison and Millinocket, Me. Later he became connected with the Eastern Talc Co., Boston, Mass., which recently was merged with the Eastern Magnesia Talc Co. of Vermont. He retired several months ago. He was a member of the Maine House of Representatives during the years 1903 to 1906, inclusive. He is survived by his wife and two daughters.

CHARLES L. UEBELE, vice-president of the Pyramid Paint Co., Philadelphia, Pa., and one of the pioneers in this line of industry in the city, died on Dec. 24, at his home, following a stroke of apoplexy 2 days previous. He was born in Germany in 1849, and came to the United States when a boy. For many years he was connected with Harrison Brothers, Philadelphia, manufacturers of paints and chemicals. In 1910 with a number of associates he formed the company of which he was vice-president. Mr. Uebele was the author of a number of books on the paint industry. He is survived by four sons and two daughters.

Men You Should Know About

J. L. BISER is now manager of the paint, varnish and printing ink division in Chicago and Middle West districts for the Wishnick-Tumpeer Chemical Co., Chicago, Ill.

HENRY M. BLACKMER, chairman of the board of directors of the Midwest Refining Co., Denver, Colo., has resigned on account of ill health. For a number of years he was president of the company, becoming chairman of the board about 12 months ago.

Prof. MARSTON TAYLOR BOGERT will, during the intermediate examinations at Columbia University, and at the invitation of various local sections of the American Chemical Society and other groups of citizens interested, deliver public lectures on the subject of "Science and Art in the Perfume Industry" in the following cities: Cleveland, Ohio, Jan. 20; Akron, Ohio, Jan. 21; Ann Arbor, Mich., Jan. 22; Chicago, Ill., Jan. 23; Evanston, Ill., Jan. 24; Madison, Wis., Jan. 27, and Minneapolis, Minn., Jan. 28. These lectures will be illustrated by the Bush collection of colored lantern slides, by perfume products from various parts of the world and by finished perfumes.

WAYNE CADWALLADER, heretofore head of Cadwallader & Co., New York, has been appointed manager of the chemical department of the Georgia Pine Turpentine Co., of the same city, with plants in Georgia and North Carolina.

Dr. F. G. COTTRELL, director of the Fixed Nitrogen Research Laboratory, U. S. Department of Agriculture, spoke on "The Future of Nitrogen Fixation" Jan. 8, at the Franklin Institute.

Calendar

AMERICAN CERAMIC SOCIETY, annual meeting, Columbus, Ohio, Feb. 16 to 21.

AMERICAN ELECTROCHEMICAL SOCIETY, Niagara Falls, April 23 to 25.

AMERICAN PULP AND PAPER MILL SUPERINTENDENTS ASSOCIATION, Niagara Falls, N. Y., June 4 to 6.

AMERICAN MANAGEMENT ASSOCIATION, annual convention, Hotel Astor, New York, Jan. 28, 29 and 30.

AMERICAN SOCIETY FOR TESTING MATERIALS, twenty-eighth annual meeting, Atlantic City, N. J., June 22 to 26.

BRUSSELS INTERNATIONAL AND COMMERCIAL FAIR (sixth), Brussels, Belgium, March 25 to April 8.

CANADIAN NATIONAL CLAY PRODUCTS ASSOCIATION, twenty-third annual convention, Prince George Hotel, Toronto, Canada, Jan. 20 to 22.

CANADIAN PULP AND PAPER ASSOCIATION, Montreal, Jan. 28 to 30.

COMPRESSED GAS MANUFACTURERS ASSOCIATION, twelfth annual meeting, Hotel Astor, New York, Jan. 26.

GAS PRODUCTS ASSOCIATION, Hotel Sherman, Chicago, Ill., Jan. 22 to 24.

NATIONAL EXPOSITION OF CHEMICAL INDUSTRIES, New York, Sept. 28 to Oct. 3.

SOCIETY OF CHEMICAL INDUSTRY, Chemists Club, New York, Jan. 16.

SOUTHERN EXPOSITION, Grand Central Palace, New York, May 11 to 23.

TECHNICAL ASSOCIATION OF THE PULP & PAPER INDUSTRY, Waldorf-Astoria, New York, Feb. 3 to 5.

Dr. HARRY A. CURTIS has accepted a consulting appointment on the staff of the Fixed Nitrogen Research Laboratory and has been assigned to the office of the director of scientific work of the Department of Agriculture. Dr. Curtis will spend a few days each month in Washington to assist Dr. Ball in the co-ordination of the various phases of fertilizer research in the several bureaus of the department.

VANCE P. EDWARDS, formerly connected with the Consolidated Water Power & Paper Co., Grand Rapids, Wis., is now with the Forest Products Laboratory of the Forest Service, Madison, Wis., where he will engage in co-ordinating research work in the laboratory with operating conditions in the pulp and paper industry.

Colonel ALAN G. GOLDSMITH of Middletown, Ohio, has resigned as chief of the European division of the Bureau of Foreign and Domestic Commerce, Washington, D. C., to resume a connection with the G. H. Mead Co., Dayton, Ohio, with which he was formerly associated. Colonel Goldsmith was one of the technical experts of the Department of Commerce, and will go abroad early in March for the Mead company to investigate European conditions in the paper industry.

C. F. GRAFF, president and general manager of the American Nitrogen Products Co., Seattle, Wash., is at the Hotel Pennsylvania this week on company business.

FRANK A. MERRICK, heretofore vice-president and general manager of the Canadian Westinghouse Co., was elected vice-president and general manager of the Westinghouse Electric & Manufacturing Co., Pittsburgh, Pa., on Jan. 1.

C. J. PATTERSON, formerly chief chemist for the Larabee Flour Mills Corporation, has established a consulting office for bakers and millers in Kansas City.

A. A. RATTI, formerly assistant in the acid department of the Repauno plant of the du Pont company, is now at that company's Louviers, Colo., plant.

C. M. RODEFER, president and treasurer, Rodefer Glass Co., Bellaire, Ohio, has returned to his home following a sojourn at a Southern resort for the benefit of his health. He is said to be considerably improved.

THOMAS WELLS has taken over the operation of the testing laboratory of A. C. Lyon & Co. in Kansas City, Mo.

W. E. WELLS, secretary-treasurer of the Homer Laughlin China Co., Newell, W. Va., was the principal speaker at an anniversary dinner dance of the East Liverpool, Ohio, Rotary Club, Dec. 29.

Market Conditions

Current Trading Featured by Larger Demand for Fertilizer Chemicals

Prices Steady Under Improved Consuming Movement—Gain in Contract Deliveries of Alkalis

MIXERS of fertilizers have entered the market in a promising way and a decided improvement has been reported since the first of the year in demand for fertilizer chemicals. Production of sulphate of ammonia has gained materially but stocks are being readily absorbed and there are no surplus stocks at producing points. During the past week interest extended to other products used in the fertilizer trade, with buying interest shown in nitrate of soda, potash salts, etc.

An unsettled market has continued for axalic acid, with the price tendency upward as a result of the higher import duty which will become effective in the latter part of this month. The market has not yet adjusted itself fully to the changed condition and some producers are reluctant to commit themselves to a fixed price at present. In order to take advantage of the higher rate of duty domestic sellers must adopt a higher price standard but if the advance is too large it will offset the increase in duty and leave importers in the same position as before the change.

The regular monthly increase in sales prices for tin salts which has been characteristic of the market recently is still in force and January deliveries of bichloride of tin, tin crystals, and tetrachloride of tin will be made at higher levels than prevailed in December. Tin oxide also was marked up in price over a week ago and has maintained the advance. The lead salts also were higher last week with an advance of one-half cent per lb. announced for basic carbonate, basic sulphate, and lead oxides.

While the price trend of chemicals was generally steady to higher, the weighted index number for the week settled at 160.25, which shows no change from the preceding week. Lower prices for crude cottonseed oil and other allied materials nullified the advances in chemicals and held the weighted number in a stationary position.

Acids

The change in import duty has placed oxalic acid in a position of interest. Inquiry has been active both on the part of consumers and of speculative traders. Asking prices have varied according to seller with some first hands not offering freely. Spot holdings closed at 11c. per lb. The advance in price has caused considerable conjecture regarding the probability of future imports and also regarding the possibility of new domestic producers entering the field. Demand for citric acid has not opened up appreciably and former price levels are being maintained. Formic acid also has been quiet but some sellers are predicting an increase in consumption in the near future. Tartaric acid is holding a steady position with 27½c. per lb. given as an inside figure for the imported material. Lactic acid has been firm for some time and while reports indicated some falling off in deliveries in the last few weeks, there has been no indication of weakness in values. Call for deliveries of sulphuric acid was of good volume last week and consumption in the fertilizer and other industries is on a rising scale. Prices are quoted at $14 per ton in tanks for 66 degree and $9 per ton for 60 degree acid. Production costs for nitric acid are a factor in steadying values for the acid.

Advances in Lead Oxides, Basic Carbonate and Sulphate of Lead — Tin Salts Higher for January Delivery—Oxalic Acid Active and Higher in Price — Prussiates Firmer — Arsenic Moving Slowly—Good Demand for Soda Ash—Small Stocks of Sulphate of Ammonia

Potashes

Bichromate of Potash—There has been more of a tendency to hold a price differential according to quantity and small lots are quoted by some factors at 8¾c. per lb. It is still possible to do 8¼c. per lb. on round lots. Export demand has been light and buying for home account also has been held to limited amounts. Chrome ore is quoted as largely nominal at $20 per ton for Indian, $22 per ton for Rhodesian, and $24 per ton for New Caledonian.

Carbonate of Potash—Only small lots of hydrated carbonate were in demand and offerings of 80-85 per cent were available at 5¼c. per lb. with intimations that this figure could be shaded on round lot business. Offerings of 96-98 per cent calcined were on the market at 6¼c. per lb. but the 80-85 per cent was still scarce and no reliable price was obtainable.

Caustic Potash—Reports from Germany state that the association which was formed last year to handle sales for export does not control the output of all producers and that offerings of independents have prevented a firmer market. Shipment prices are holding at 7⅜c. per lb. with holdings in the local market barely steady at 7¼c. per lb. Domestic caustic is quoted at 7⅜c. per lb. in carlots at works.

Nitrate of Potash—Regular arrivals of nitrate of potash from abroad is indicative of the better demand for the foreign-made product. Prices for the latter are favorable to buyers as they are under those generally quoted by domestic producers. Quotations for domestic nitrate are 6@6¼c. per lb. for granulated and 7@7¼c. per lb. for powdered.

Permanganate of Potash — There were reports that shipments of foreign permanganate were offered at 14c. per lb. Spot holdings, however, were held at 14½c. per lb. and sellers of the domestic material have a price scale graded according to quantity with 14½@15c. per lb. representing asking prices.

Prussiate of Potash—Sellers of domestic prussiate have been reserved and cables from foreign markets have borne out reports that values were higher abroad. Yellow prussiate on spot was quoted at 18c. per lb. and upward. Red prussiate was held at 38c. per lb. but was inactive and the quoted price might be bettered on actual business.

Sodas

Soda Ash—Recent buying on the part of the glass trade was reported to be active and similar reports were current in the past week. Shipping instructions for contract deliveries also are coming to hand in good numbers and a seasonal movement is predicted for the current month. There is no change in the price schedule. Contracts of light ash are offered at $1.25 per 100 lb. in bulk, and $1.38 per 100 lb. in bags, carlots, at works. Dense ash on contract is quoted at $1.35 per 100 lb. in bulk, and $1.45 per 100 lb. in bags.

Bichromate of Soda — Competition among sellers has quieted down and in some quarters it is stated that a large percentage of the output is sold ahead and producers do not care to book additional orders at the current contract level. Sales of small lots for prompt shipment have been made at 6½@6¾c. per lb. and the market gives evidence of firmness in contrast to the irregularity which featured values in the past month or longer. On carlot business 6¼c. per lb. at works is quoted.

Caustic Soda—Improvement is reported in deliveries against contracts and prospects are favorable for a larger consumption and distribution than in 1924. Jobbing business has been quiet

in recent weeks but is gaining in volume. Export demand is not active but shipments are going forward to foreign countries with a fair show of regularity. Prices are steadier than a month ago and f.a.s. quotations are held at \$2.95@\$3.10 per 100 lb. The contract price for domestic delivery is unchanged at \$3.10 per 100 lb. for solid caustic in standard drums, carlots, f.o.b. works.

Nitrate of Soda—Reports have been current to the effect that competition of American trade in nitrate would increase and in fact this has been so to a slight extent, yet values are holding steady at present. Consumers are taking deliveries against contracts in a satisfactory manner and there was more inquiry in the market last week. Exchange has had some effect in strengthening values. January shipments are quoted at an inside figure of \$2.53 per 100 lb.

Prussiate of Soda—Stocks have been reduced and increase in demand has been coincident with reports of higher markets for imported prussiate. Buying for speculative account has been prominent and values have strengthened. Asking prices for spot material are 10c. per lb.

Miscellaneous Chemicals

Acetone—The reduction in price as announced in the preceding week was maintained and sellers were offering carlots freely on a basis of 12c. per lb., at works. Quotations for less than carlots ranged up to 14c. per lb., according to quantity.

Arsenic—The announcement that domestic production of arsenic made a new record last year has emphasized the fact that the carryover of arsenic, either as such or in arsenic compounds, must be very large in view of the unsatisfactory reports of consumption of calcium arsenate, which is the largest outlet for arsenic. This large surplus overhangs the market and depresses trading. Very little interest was reported last week and prices were nominally given at 6@6½c. per lb.

Barium Carbonate—Buyers have not been in the market to any extent and sellers have been willing to grant concessions. Spot material has been quoted as low as \$52 per ton, which is also the quotation for shipments. The chloride is easy at \$61 per ton on spot.

Sulphate of Ammonia — Consumers are calling for deliveries against contracts and this is sufficient to take up practically all of the home output in spite of an increase in production. Prices are quoted at \$2.75@\$2.80 per 100 lb. in bulk, at works. Good demand has continued for imported synthetic sulphate and a large tonnage has been booked for prompt and nearby deliveries. Importers offer on a basis of \$2.85@\$2.90 per 100 lb. in bulk, for large lots.

Tin Salts — The average price for Straits tin in December was 56.245c. per lb., which compares with 54.348c. per lb. for November. The influence of the higher metal market was shown in an advance in tin oxide, which went up to 61c. per lb. at the beginning of the month. Bichloride of tin was marked up to 16½c. per lb. and tin crystals advanced 2c. per lb. to a basis of 40½c. per lb. Anhydrous tetrachloride of tin shared in the advance and current quotations are 33½c. per lb.

"Chem. & Met." Weighted Index of Chemical Prices

Base = 100 for 1913-14

This week	160.25
Last week	160.25
Jan., 1924	166.00
Jan., 1923	173.00
Jan., 1922	144.00
Jan., 1921	181.00
Jan., 1920	242.00
Jan., 1919	262.00
Jan., 1918	281.00

Easiness in crude cottonseed oil and tallow was offset by a higher market for prussiate of soda, lead pigments and crude glycerine. The index number held at 160.25.

Alcohol

There was a steady call for denatured alcohol and, with no important change in the basic materials, prices ruled firm. The selling schedule was maintained at 55@55½c. per gal. on the completely denatured, formula No. 5, 188 proof, in drums.

Several shipments of butyl alcohol arrived from Europe. The situation was unchanged, the demand being fairly active and prices steady at 26@28c. per lb., carload basis.

Demand for methanol showed no gains of consequence and, with offerings liberal, prices were barely steady. On the 97 per cent material traders asked 72c. per gal., in drums, carload lots. Pure methanol, tank cars, works, closed unchanged at 74c. per gal.

Coal-Tar Products

Better Demand for Toluene—Refined Naphthalene Barely Steady—Phenol Unsettled—Imported Pyridine Advances

INQUIRY developed for toluene and this disclosed that stocks in the hands of producers were small. The undertone of the market strengthened, but brought out no actual change in the selling basis. There has been no accumulation in supplies of 90 per cent and pure benzene, owing to the good outlet for the motor grades, and traders regarded the situation as favorable. Latest returns on production of byproduct coke indicate that further gains were made in December, but the increase was hardly sufficient to bring out any radical change in the outlook. With the tendency of prices for gasoline upward the prospects for moving available supplies of motor benzene at higher prices are encouraging. There was little or no improvement in the spot position of either refined naphthalene or U.S.P. phenol and prices in some directions were subject to shading. Demand for pyridine has improved, and, with foreign markets steady, sellers here raised their views slightly. H-acid was available in a fairly large way at unchanged prices. Competition among sellers of paranitraniline tends to unsettle the market for this intermediate.

Benzene—There was a steady tone to market for all grades of benzene. Deliveries of the motor fuel grade were large enough to absorb practically all of the output. Leading operators quote the market for the 90 per cent material as unchanged at 23c. per gal., and the pure at 25c. per gal., tank cars, f.o.b. works.

Beta-Naphthol — Producers maintained prices at 24@25c. per lb., as to quantity. Demand has been fair and the undertone favors sellers.

Creosote — British markets higher, nominal prices ranging from 6@6½d. per gal., loose, works. Exports of creosote and tar oils from the United Kingdom for the 11 months ended Nov. 30 amounted to 40,400,328 gal., which compares with 44,253,480 gal. for the corresponding period a year ago.

Cresylic Acid — Market was barely steady on rather liberal offerings from domestic producers. Demand disappointing and competition for business has resulted in some price concessions. On the 97 per cent grade quotations range from 59@62c. per gal., in drums, the inside figure obtaining on carload lots, f.o.b. works.

Naphthalene—Some traders appeared more anxious for business and this brought out a little irregularity in spot quotations for both flake and ball. The demand was inactive, most buyers operating in a hand-to-mouth way. Producers generally held out for 5½c. per lb. on white flake and 6½c. per lb. on ball, round lot basis, all positions. Chipped material was nominal at 4½@5c. per lb., as to quantity and seller. Crude was unchanged around the 2c. level.

Paranitraniline—Quotations heard in the local trade varied considerably. There were sellers at 65@70c. per lb. Demand has improved, but competition for business was keen, causing unsettlement in the market.

Phenol—Most of the output has been contracted for and leading makers held to the old schedule of prices. Spot material was offered more freely and this imparted an easier feeling to the market. Prices named by producers ranged from 23@24c. per lb. on the U.S.P. grade.

Pyridine — Spot imported material sold at \$4 per gal. Stocks have been reduced and, with foreign markets in a relatively firm position, traders here have advanced the market to \$4@\$4.25 per gal. A week ago there were sellers down to \$3.80 per gal. On futures importers quote \$3.90 per gal.

Toluene—A good inquiry was in evidence in toluene and, with stocks moderate in all directions the undertone of the market was very much firmer toward the close of the week. Producers, however, did not change the selling basis, quoting 26c. per gal., tank cars, shipment from works. Spot material, in drums, settled at 31@33c. per gal., as to seller.

Vegetable Oils and Fats

Cottonseed Oil Unsettled—Linseed Quiet—Coconut Higher for Future Delivery—Sharp Decline in Tallow

THE feature in the market was the decline in tallow. Soap makers lowered their bids and some weak holders sold material "at the market," which resulted in a decline of 1c. per lb. The weakness in tallow did not spread to vegetable oils, and, aside from a little unsettlement in cottonseed oil, the undertone remained quite steady. Ceylon type coconut oil was higher on strength in copra. Offerings of palm oils for nearby delivery were scanty, with prices largely nominal. Linseed oil was a dull affair, yet no selling pressure was in evidence. More buying interest developed in China wood oil. Sales of crude corn oil took place at unchanged prices. A bulk lot of English palm kernel oil arrived here last week.

Cottonseed Oil — Prices for refined cottonseed oil in the option market on the Produce Exchange were unsettled over the greater part of the week, the average being close to 25 points lower. This was caused by liquidation on the part of Western speculative interests, who unloaded on the decline in pure lard. The offerings were readily absorbed, covering by local shorts being a factor on the buying end. Refined oil was not a good hedging proposition and refiners indulged in less selling. Cash demand for refined oil was moderate, but several good trades went over in lard compound. One producer was credited with selling 23 cars of compound on Tuesday. With a wide spread between pure lard and lard compound traders expect that the proportion of cottonseed oil entering into the latter product will show a gain in 1925. Prime summer yellow oil in the option market settled at 11.17c. per lb. bid for Jan., 11.26c. per lb. bid for March and 11.60c. per lb. bid for May. Lard compound was steady at 13¾c. per lb., in bbl., carload basis. Crude oil sold down to 9⅝c. per lb. in Texas, tank car basis, f.o.b. mills, but later advanced to 9½c. In the Southeast quotations for crude ranged from 9½to 9¾c. per lb., tank cars, f.o.b. mills. Stocks of lard in the Chicago district on Dec. 1 amounted to 20,345,742 lb., which compares with 8,339,144 lb. on the corresponding date a year ago. Pure lard in the Chicago market settled with cash quoted at 15.90c. per lb., and March at 16.20c. per lb.

Linseed Oil—Trading in linseed oil was inactive throughout the week, but this brought out no uneasiness on the part of sellers. The flaxseed markets showed little change and quotations for oil were maintained on the basis of $1.15 per gal., in bbl., carload lots, January delivery. Futures held at $1.16@$1.17 per gal., according to position. Recent buying of foreign oil took on fairly large proportions, Pacific coast interests taking approximately 5,000 tons for shipment from abroad over the next 2 months. The nominal quotation for foreign oil toward the close of the week was $1.11 per gal., in bbl., duty paid, New York. With so much conflicting news on the new Argentine crop both buyers and sellers refused to take a definite stand on the situation. Because of the peculiar condition of the crop in the different sections of the flaxseed belt the government has postponed publication of its December report. Reports from several sections in the Argentine have been more favorable, but the whole outlook is extremely "spotty" and estimates on the crop vary to a greater extent than in previous years. Buenos Aires quoted February option seed at $2.41¼c. per bu., which compares with $2.38½c. a week ago. Duluth quoted Jan. seed at $3.03 per bu., with May at $3.04½ per bu. The latest official report on the Canadian crop places the yield for 1924 at 8,626,000 bu. Private estimates have been somewhat lower. The quantity of Canadian seed marketed to date from the last crop amounted to 4,000,000 bu.

Flaxseed Receipts in First 4 Months of Season Heavy

Receipts of flaxseed at Minneapolis and Duluth from Sept. 1 to Dec. 31, 1924, amounted to 24,670,000 bu., which compares with 12,530,000 bu. for the corresponding period a year ago. The total crop for the 1924-25 season is estimated by the Department of Agriculture at 30,173,000 bu. The receipts of the two northwestern terminals for the 4 months ended Dec. 31 represent approximately 80 per cent of the crop, providing the official estimate on production proves correct. In 1923 receipts over the first 4 months of the season amounted to 12,530,000 bu., which compares with 15,558,000 bu. for the entire crop year, and 17,060,000 bu., the estimated total yield.

China Wood Oil—Sales took place at 13½c. per lb., tank car basis, nearby shipment from the Pacific coast. Later 13¾c. was asked, with the undertone firm on improved inquiry from varnish makers. In New York 15½c. was asked for spot oil in cooperage.

Corn Oil—Crude oil sold at 10½c. per lb., tank cars, f.o.b. point of production in the Middle West.

Coconut Oil—Ceylon type oil for immediate shipment was advanced to 10¾c. per lb., tank cars, f.o.b. New York. On the Pacific coast 10¼c. was asked for prompt oil and 10c. for futures. No important buying took place; sellers advanced their ideas on higher prices for copra.

Palm Oils—The decline in tallow affected buyers' views as regards both spot and forward material, but little actual change occurred in prices. Offerings of nearby material remain light. Lagos oil for Jan.-Feb.-March shipment from Africa was available at 9⅝c. per lb. Niger for future delivery was offered at 8⅞c. per lb. Softs for nearby delivery held at 9¾c. per lb.

Soya Bean Oil—Crude oil on spot was offered at 13c. per lb., in cooperage. On the Pacific coast Jan.-Feb. oil held at 11¼c. asked, tank cars, duty paid.

Menhaden Oil—One lot of crude was offered at 53½c. per gal., tank car basis, f.o.b. factory, North Carolina. In the Chesapeake Bay district 55c. was asked.

Tallow, Etc.—With soap makers in a position to take on competing oils and fats to better advantage the advance in tallow could not be maintained. Offerings increased and prices broke sharply. Outside tallow, equal to city extra in quality, sold as low as 10c. per lb., while city extra brought 10¼c. A week ago sales of extra went through at 11c. per lb. Yellow grease declined to 9⅜@9⅝c. per lb. Oleo stock sold at 11¾c. per lb., and oleo stearine was available at 11½c. per lb.

Miscellaneous Materials

Antimony — Offerings of Chinese brands were limited and firm prices obtained in all quarters, the range being 17¾@18c. per lb. Cookson's "C" grade higher at 19½c. per lb. Chinese needle lump nominal at 10c. per lb. Standard powdered needle, 200 mesh, 11½c. per lb. White oxide of antimony, Chinese, 99 per cent, 13@14c. per lb.

Glycerine—Offerings of crude glycerine for nearby delivery were comparatively small and the market closed in a firmer position. Soap lye crude, basis 80 per cent, loose, settled at 13c. per lb. asked, which compares with 12½c. asked a week ago. Saponification, basis 88 per cent, loose, advanced to 14@14¼c. per lb., f.o.b. point of production. Dynamite transactions were few in number, but sellers' views were maintained at 18¾c. per lb., in drums, carload lots, New York territory, with a possibility of doing 18½c. per lb. in the Middle West. There was a fair inquiry for chemically pure at 19@19¼c. per lb., in drums, immediate shipment.

Litharge—The advance in pig lead caused corroders to mark up prices for litharge ½c. per lb. The revised quotation is 12¾c. per lb., in casks, carload lots.

Naval Stores — Demand was fairly active, in both an export and a domestic way, and prices closed higher. Spirits of turpentine registered a net gain of 9c. per gal., closing at 93@94c. per gal., in bbl. On the lower grades of rosin the price was advanced to $8.10@$8.20 per bbl.

White Lead—Strong conditions in the pig lead market brought out another advance in lead pigments. Pig lead was raised to 10c. per lb. by leading producers, with offerings extremely light even at the higher figure. Corroders advanced the pigments ½c. per lb., effective Jan. 6. This established the market for standard dry white lead at 11½c. per lb., and the sublimed at 11c. per lb., in bbl. or casks, carload lots. Dry red lead settled at 13¼c. per lb., and orange mineral at 16¼c. per lb.

Imports at the Port of New York

January 2 to January 8

ACIDS—Formic—420 demijohns, Rotterdam, R. W. Greeff & Co. **Oxalic**—12 csk., Rotterdam, F. Rudloff. **Stearic**—20 cs., Rotterdam, M. W. Parsons & Plymouth Organic Lab. **Tartaric**—544 csk., Rotterdam, W. Newburg; 400 csk., Palermo, W. Newburg; 10 csk., Palermo, C. Huisking, Inc.; 100 csk., Palermo, Order.

ALBUMEN—72 cs., Shanghai, Order; 32 cs., Shanghai, Anglo-South American Trust Co.; 56 cs., Shanghai, Balfour, Williamson & Co.

ALCOHOL—85 csk. butanol, Rotterdam, Kuttroff, Pickhardt & Co.; 91 dr. do., Rottedam, H. A. Metz & Co.; 457 bbl. denatured, Arecibo, Order.

AMMONIUM CARBONATE — 5 csk., Liverpool, Brown Bros. & Co.

ANTIMONY REGULUS—500 cs., Changsha, C. Gitlan; 1,150 cs., Hankow, F. A. Cundill & Co.

ARSENIC—186 bbl., Tampico, American Metal Co.

ASBESTOS—155 cs. crude, London, Asbestos & Mineral Corp.

BARYTES—1 lot (in bulk), Rotterdam, Ore & Chemicals Corp.

CALCIUUM NITRATE — Rotterdam, Kuttroff, Pickhardt & Co.

CARBON BLACK—175 csk., Antwerp, F. Von Geisten.

CASEIN—834 bg., Buenos Aires, Kalbfleisch Corp.

CHALK—400 bg., Antwerp, Brown Bros. & Co.; 276 bbl., Antwerp, National City Bank; 1,000 bg., Antwerp, Brown Bros. & Co.; 800 bg., Bristol, H. J. Baker & Bro.

CHEMICALS—100 csk. and 100 cs., Rotterdam, Hans Hinrichs Chem. Co.; 32 pkg., Rotterdam, W. F. Eissing; 15 csk., Rotterdam, Alpers & Mott; 250 bg., Rotterdam, P. Uhlich & Co.; 267 pkg., Rotterdam, Order; 150 cs., Havre, Order; 425 bg., Glasgow, Brown Bros. & Co.; 28 csk., Glasgow, Frazar & Co.; 274 bg., Glasgow, Brown Bros. & Co.; 247 csk., Rotterdam, A. Klipstein & Co.; 100 csk., Rotterdam, Hummel & Robinson; 155 csk., Rotterdam, Stanley Doggett, Inc.

CHINA CLAY—25 csk., Bristol, C. T. Wilson & Co.; 535 bg., Bristol, National City Bank.

COLORS — 13 kegs vermilion, London, Pomeroy & Fischer; 65 csk. aniline, Rotterdam, Kuttroff, Pickhardt & Co.; 30 pkg. aniline, Havre, Ciba Co.; 10 csk. do., Havre, Carbic Color & Chemical Co.; 70 csk. do., Havre, American Exchange National Bank; 47 pkg. aniline, Havre, Sandoz Chemical Works; 4 cs. aniline, Genoa, Bernard Bernard, Inc.; 21 csk. aniline, Havre, American Exchange National Bank; 63 pkg. do., Havre, Ciba Co.; 20 csk. dry, London, R. F. Downing & Co.; 18 bbl. ultramarine blue, Glasgow, Order; 32 csk., Rotterdam, Grasselli Dyestuff Corp.

DEXTRINE—200 bg. potato, Rotterdam, Stein, Hall & Co.

FERROTITANIUM — 3 kegs, Liverpool, Order.

FORMALDEHYDE HYDROSULPHIDE—140 csk., Rotterdam, Kuttroff, Pickardt & Co.

FUSEL OIL—12 dr., Antwerp, Order; 15 csk., Marseilles, National City Bank.

GLYCERINE—27 dr. crude, Shanghai, International Banking Corp.

GRAPHITE—100 bg., Marseilles, Order.

GUMS — 75 cs. copal, Singapore, Brown Bros. & Co.; 58 cs. do., Singapore, Baring Bros. & Co.; 100 cs. damar, Singapore, Baring Bros. & Co.; 100 bg. damar, Singapore, Equitable Trust Co.; 366 pkg. damar and 490 bg. copal, Singapore, L. C. Gillespie & Sons; 50 bg. copal, Singapore, Baring Bros. & Co.; 520 bg. damar, 130 cs. do., Singapore, Order; 50 cs. damar, Singapore, Order; 130 bskt. copal, Macassar, L. C. Gillespie & Sons; 302 bskt. do., Macassar, S. Winterbourne & Co.; 73 bskt. do., Macassar, L. Van Norden; 133 bskt. do., Macassar, W. H. Scheel; 286 bskt. do., Macassar, Patterson, Boardman & Knapp; 472 bskt. do., Macassar, Irving Bank-Col. Trust Co.; 220 bskt. do., Macassar, Standard Bank of South Africa; 138 bskt. do., Macassar, Equitable Trust Co.; 215 bskt. do., Macassar, Order; 100 pkg. damar, Batavia, Brown Bros. & Co.; 100 cs. do., Batavia, Bank of Manhattan Co.; 200 cs. do., Batavia, Central Union Trust Co.

INFUSORIAL EARTH—8,219 bg., Oran, Orelite Co.; 3,813 bg., Oran, Order.

IRON OXIDE—5 csk., Liverpool, J. Lee Smith & Co.; 30 csk., Liverpool, Bank of America; 30 csk., Liverpool, L. H. Butcher & Co.; 46 csk., Liverpool, J. A. McNulty; 30 csk., Bristol, J. Lee Smith & Co.; 210 bg., Bristol, G. Z. Collins & Co.; 30 csk., Hull, J. Lee Smith & Co.

LITHOPONE—50 csk., Antwerp, E. M. & F. Waldo; 8 csk., Antwerp, A. Maharrie; 50 pkg., Rotterdam, P. Uhlich & Co.; 600 csk., Antwerp, B. Moore & Co.

MAGNESITE—25 bbl., Antwerp, Salomon Bros.; 50 bbl., Antwerp, Whittaker, Clark & Daniels.

MAGNESIUM CARBONATE — 24 cs., Hull, E. J. Barry.

MANGANESE CHLORIDE — 42 csk., Glasgow, A. Klipstein & Co.

Opportunities in the Foreign Trade

Parties interested in any of the following opportunities may obtain all available information from the Bureau of Foreign and Domestic Commerce at Washington or from any district office of the bureau. The number placed after the opportunity must be given for the purpose of identification.

PAINTS AND VARNISHES. Palermo, Italy. Purchase.—13,031.

COTTONSEED OILCAKE AND MEAL. Hamburg, Germany. Agency.—12,979.

OILS, linseed and soya. Valetta, Malta. Agency.—12,974.

ASBESTOS, sheet roofing. Tampico, Mexico. Agency.—13,003.

MINERAL OILS. Athens, Greece. Agency.—13,037.

MANGANESE ORE—3,269 bg., Antilla, H. S. Predmore; 317 bg., Antilla, Electro Metallurgical Co.

MINERAL WHITE — 1,200 bg., Hull, Hammill & Gillespie.

MYROBALANS — 1,000 bg., Calcutta, Standard Bank of South Africa.

OCHER—370 csk., Marseilles, American Exchange National Bank; 272 bbl., Marseilles, J. Lee Smith & Co.; 225 bbl., Marseilles, Reichard-Coulston, Inc.; 150 csk., Marseilles, J. Lee Smith & Co.; 100 csk., Marseilles, Order.

OILS—Cod—300 csk., St. Johns, National Oil Products Co.; 50 bbl., St. Johns, Bowring & Co.; 150 csk., St. Johns, Order. **Coconut** — 844 tons, Manila, Procter & Gamble. **China Wood**—63 dr., Shanghai, F. A. Cundill & Co.; 162 cs., Hankow, G. W. S. Patterson & Co.; 117 dr., Shanghai, St. Clair Oil Co.; 152 csk., Shanghai, Bingham & Co.; 148 csk., Shanghai, Irving Bank-Col. Trust Co.; 96 bbl., Shanghai, Olivier Produce Corp.; 204 bbl., Shanghai, Viele, Blackwell & Buck; 96 bbl., Shanghai, Order. **Linseed** — 127 dr., Rotterdam, Order; 85 bbl., Hull, Order; 5 csk., Rotterdam, Order. **Olive foots** (sulphur oil)—300 bbl., Bari, National City Bank. **Palm kernel** — 786 tons and 105 bbl., Hull, Order. **Palm**—52 csk., Liverpool, Core & Herbert; 75 csk., Liverpool, Guaranty Trust Co.; 38 csk., Liverpool, Rayner & Stonington; 55 csk., Liverpool, Order; 458 dr., Antwerp, Order. **Peanut**—10 bbl., Rotterdam, Lamont, Corliss & Co. **Rapeseed**—150 bbl., Hull, J. C. Francesconi & Co.; 20 bbl., Hull, Order. **Sperm**—250 bbl., Glasgow, Baring Bros. & Co.

OILSEEDS—Copra—625 bg., Trinidad, Order. **Castor** — 1,500 bg., Bahia, F. Matarazzo; 3,000 bg., Santos, Order.

POTASSIUM SALTS—190 csk. nitrate, Rotterdam, Order; 275,000 kilos manure salt, Antwerp, Societe Commerciale des Potasses d'Alsace; 36 kegs prussiate, Liverpool, C. Tennant Sons & Co.

QUEBRACHO—1,046 bg., Buenos Aires, New York Trust Co.; 2,062 bg., Buenos Aires, First National Bank of Boston; 7,763 bg., Buenos Aires, Tannin Corp.; 3,816 bg., Buenos Aires, International Products Co.

SAL AMMONIAC—230 csk., Rotterdam, Kuttroff, Pickhardt & Co.

SHELLAC — 500 bg., Calcutta, Brunswick, Balke Collender Co.; 200 bg., Calcutta, British Overseas Bank; 425 bg., Calcutta, Brown Bros. & Co.; 333 bg., Calcutta, Marx & Rawolle; 150 bg., Calcutta, Order; 141 cs., Marseilles, Order; 400 bg., Calcutta, New York Trust Co.; 60 bg., Calcutta, Marx & Rawolle; 279 bg., Calcutta, Brown Bros. & Co.; 100 bg., Calcutta, H. W. Peabody & Co.; 1,623 bg., Calcutta, Order; 168 cs., Shanghai, Order; 70 cs., Singapore, National City Bank; 315 cs., Singapore, Order; 112 bg., Singapore, Amsinck, Sonne & Co.

SODIUM SALTS — 44 csk. prussiate, Liverpool, C. Tennant Sons & Co.; 888 pkg. cyanide, Havre, International Banking Corp.; 545 bg. phosphate, Order; 50 dr. sulphate, Bristol, R. F. Downing & Co.; 135 cs. cyanide, Liverpool, Order; 250 csk. nitrate, Rotterdam, Kuttroff, Pickhardt & Co.; 256 cs. cyanide, Rotterdam, Roessler & Hasslacher Chemical Co.; 31 csk. prussiate, Rotterdam, Order.

STARCH—50 bg. potato, Rotterdam, J. Morningstar & Co.; 250 bg., Rotterdam, Spier, Simmons & Co.; 100 bg., Rotterdam, Arabol Mfg. Co.

STEARINE PITCH—200 bbl., Liverpool, Order.

SUMAC—50 bg., Alexandretta, Order.

TANNING EXTRACT—20 bbl., London, S. Saxe.

TARTAR—796 bg., Marseilles, C. Pfizer & Co.; 1,132 bg., Marseilles, Royal Baking Powder Co.; 335 bg., Alicante, C. Pfizer & Co.

UMBER—25 csk., Bristol, National City Bank.

VALONEA—3,671 bg., Chanak, Order; 2,687 bg., Smyrna, Order.

WAXES — 18 bg. beeswax, Rotterdam, Order; 9 bg. beeswax, Azua, J. J. Julia & Co.; 3 bg. do., Azua, Order; 7 bg. do., Sanchez, etc., Order; 4 bg. do., Monte Cristi, Order; 113 bg. carnauba, Ceara, National City Bank; 124 bg. do., Ceara, Lazard Freres; 223 bg. do., Ceara, New York Trust Co.; 56 bg. do., Ceara, Order; 33 bg. carnauba, Rio de Janeiro, Order; 23 cs. beeswax, Alexandria, Bank of America; 2,800 bg. paraffine, Balikpapan, Asiatic Petroleum Co.; 50 cs. spermaceti, London, Order; 32 bg. beeswax, Caibarien, D. Steengrafe.

WOOL GREASE—25 bbl., Antwerp, Order; 20 bbl., Hull, Marden, Wild Corp.

ZINC SULPHIDE—2 csk., London, C. A. Sykes.

ZINC CHLORIDE—37 dr., Rotterdam, C. Hardy, Inc.

ZINC OXIDE—30 bbl., Marseilles, Chemical National Bank; 52 bbl., Marseilles, Order; 60 bbl., Marseilles, Reichard-Coulston, Inc.; 25 csk., Antwerp, E. M. & F. Waldo; 150 bbl., Marseilles, American Exchange National Bank.

Industrial Notes

The American Kreuger & Toll Corporation, importer and manufacturer of chemicals and apparatus, has moved from 522 Fifth Ave. to the Engineering Building at 114-118 Liberty St., New York.

The Diamond Power Specialty Corporation of Detroit, Mich., manufacturer of Diamond soot blowers for water tube and horizontal return tubular boilers, has appointed the Midwest Machinery Co., 104-108 South Main St., St. Louis, Mo., as its representative for the territory of Missouri adjacent to St. Louis, south of and including Springfield and Decatur, Ill.

Current Prices in the New York Market

For Chemicals, Oils and Allied Products

THESE prices are first-hand quotations in the New York market for industrial chemicals, coal-tar products and related materials used in the industries that produce

Dyes	**Paper and Pulp**
Paint and Varnish	**Petroleum**
Ceramic Materials	**Soap**
Fertilizers	**Explosives**
Rubber	**Food Products**
Sugar	**Metal Products**

Whenever available these prices are those of the American manufacturer. If for material f.o.b. works or on a contract basis, quotations are so designated. All prices refer to large quantities in original packages.

Industrial Chemicals

Acetone, drums, works	lb.	$0.12 –	$0.12½
Acetic anhydride, 85%, dr.	lb.	.36 –	.38
Acid, acetic, 28%, bbl.	100 lb.	3.12 –	3.37
Acetic, 56%, bbl.	100 lb.	5.85 –	6.10
Acetic, 80%, bbl.	100 lb.	8.19 –	8.44
Glacial, 99½%, bbl.	100 lb.	11.01 –	11.51
Boric, bbl.	lb.	.09 –	.09½
Citric, kegs	lb.	.45½–	.46½
Formic, 85%	lb.	.10½–	.10½
Gallic, tech.	lb.	.45½–	.47
Hydrofluoric, 52%, carboys	lb.	.11 –	.12
Lactic, 44%, tech., light, bbl.	lb.	.13½–	.14
22% tech., light, bbl.	lb.	.06½–	.07
Muriatic, 18° tanks	100 lb.	.80 –	.85
Muriatic, 20°, tanks	100 lb.	.95 –	1.00
Nitric, 36°, carboys	lb.	.04 –	.04½
Nitric, 42°, carboys	lb.	.04½–	.05½
Oleum, 20%, tanks	ton	16.00 –	17.00
Oxalic, crystals, bbl.	lb.	.10½–	.11
Phosphoric, 50% carboys	lb.	.07½–	.07¾
Pyrogallic, resublimed	lb.	1.55 –	1.60
Sulphuric, 60°, tanks	ton	8.00 –	9.00
Sulphuric, 60°, drums	ton	12.00 –	13.00
Sulphuric, 66°, tanks	ton	13.00 –	14.00
Sulphuric, 66°, drums	ton	17.00 –	18.00
Tannic, U.S.P., bbl.	lb.	.65 –	.70
Tannic, tech., bbl.	lb.	.45 –	.50
Tartaric, imp., powd., bbl.	lb.	.27½–	.28
Tartaric, domestic, bbl.	lb.	.29 –	.30
Tungstic, per lb.	lb.	1.20 –	1.25
Alcohol, butyl, drums, wks.	lb.	.27 –	.30
Ethyl, 190 p'f. U.S.P., bbl.	gal.	4.89 –	.....
Denatured, 190 proof No. 1, special bbl.	gal.	.61 –	.....
No. 1, 190 proof, special, dr.	gal.	.55 –	.....
No. 1, 188 proof, bbl.	gal.	.65 –	.....
No. 1, 188 proof, dr.	gal.	.58 –	.....
No. 5, 188 proof, bbl.	gal.	.60 –	.....
No. 5, 188 proof, dr.	gal.	.55 –	.....
Alum, ammonia, lump, bbl.	lb.	.03½–	.04
Potash, lump, bbl.	lb.	.02¾–	.03½
Chrome, lump, potash, bbl.	lb.	.05½–	.06
Aluminum sulphate, com., bags	100 lb.	1.40 –	1.45
Iron free, bags	lb.	2.40 –	2.45
Aqua ammonia, 26°, drums	lb.	.06½–	.06¾
Ammonia, anhydrous, cyl.	lb.	.28 –	.30
Ammonium carbonate, powd. tech., casks	lb.	.12½–	.12¾
Nitrate, tech., casks	lb.	.09 –	.10
Amyl acetate tech., drums	gal.	3.25 –	3.50
Antimony oxide, white, bbl.	lb.	.13 –	.14
Arsenic, white, powd., bbl.	lb.	.06½–	.06¾
Red, powd., kegs	lb.	.14½–	.15½
Barium carbonate, bbl.	ton	53.00 –	54.00
Chloride, bbl.	ton	62.00 –	68.00
Dioxide, 88%, drums	lb.	.17½–	.18
Nitrate, casks	lb.	.07½–	.08
Blanc fixe, dry, bbl.	lb.	.03½–	.03¾
Bleaching powder, f.o.b. wks., drums, contract	100 lb.	1.90 –	.....
Spot, wks., drums	100 lb.	2.00 –	2.15
Borax, bbl.	lb.	.05 –	.05½
Bromine, cases	lb.	.44 –	.45
Calcium acetate, bags	100 lb.	3.00 –	3.05
Arsenate, dr.	lb.	.08 –	.08½
Carbide, drums	lb.	.05 –	.05½
Chloride, fused, dr. wks.	ton	21.00 –	.....
Gran. drums works	ton	27.00 –	.....
Phosphate, mono, bbl.	lb.	.06½–	.07½
Carbon bisulphide, drums	lb.	.06 –	.06½
Tetrachloride, drums	lb.	.06½–	.07½
Chalk, precip.—domestic, light, bbl.	lb.	.04½–	.04¾
Imported, light, bbl.	lb.	.04½–	.05
Chlorine, liquid, tanks, wks.	lb.	.04½–	.....
Contract, tanks, wks.	lb.	.04 –	.....
Cylinders, 100 lb., wks.	lb.	.05½–	.07½
Cobalt, oxide, bbl.	lb.	2.10 –	2.25
Copperas, bulk, f.o.b. wks.	ton	15.00 –	16.00
Copper carbonate, bbl.	lb.	.16½–	.17
Cyanide, drums	lb.	.49 –	.50
Oxide, kegs	lb.	.16½–	.16¾
Sulphate, dom., bbl.	100 lb.	4.65 –	4.75
Imp. bbl.	100 lb.	4.55 –	.....
Cream of tartar, bbl.	lb.	.20½–	.21
Epsom salt, dom., bbl.	100 lb.	1.75 –	2.00
Imp., tech., bags	100 lb.	1.35 –	1.40
U.S.P., dom., bbl.	100 lb.	2.10 –	2.35
Ether, U.S.P., dr concent'd.	lb.	.15 –	.16
Ethyl acetate, 85%, drums	gal.	.92 –	.95
Acetate, 99%, dr.	gal.	1.08 –	1.10
Formaldehyde, 40%, bbl.	lb.	.09 –	.09½
Fullers earth—f.o.b. mines	ton	7.50 –	18.00
Furfural, works, bbl.	lb.	.23 –	.....
Fusel oil, ref., drums	gal.	4.00 –	4.50
Crude, drums	gal.	3.00 –	3.25
Glaubers salt, wks., bags	100 lb.	1.20 –	1.40
Imp., bags	100 lb.	.80 –	.90
Glycerine, c. p., drums extra	lb.	.19 –	.19½
Crude 80%, loose	lb.	.13 –	.13½
Hexamethylene, drums	lb.	.65 –	.67
Lead:			
White basic carbonate, dry, casks	lb.	$0.11½–	.....
White, basic sulphate, casks	lb.	.11 –	.....
White, in oil, kegs	lb.	.1326–	.....
Red, dry, casks	lb.	.13½–	.....
Red, in oil, kegs	lb.	.1447–	.....
Acetate, white crys., bbl.	lb.	.15½–	.....
Brown, broken, casks	lb.	.14½–	.....
Arsenate, white crys., bbl.	lb.	.16 –	$0.18
Lime-Hydrated, b.g., wks.	ton	10.50 –	12.50
Bbl., wks.	ton	18.00 –	19.00
Lump, bbl.	280 lb.	3.63 –	3.65
Litharge, comm., casks	lb.	.12½–	.....
Lithopone, bags	lb.	.06 –	.06½
Magnesium carb., tech., bags	lb.	.07 –	.08
Methanol, 95%, drums	gal.	.70 –	.72
97%, drums	gal.	.72 –	.74
Pure, tanks	gal.	.74 –	.76
drums	gal.	.78 –	.80
bbl.	gal.	.83 –	.85
Methyl-acetone, t'ks	gal.	.70 –	.....
Nickel salt, double, bbl.	lb.	.10 –	.....
Single, bbl.	lb.	.10½–	.....
Orange mineral, csk.	lb.	.16½–	.16½
Phosgene		.60 –	.75
Phosphorus, red, cases	lb.	.70 –	.75
Yellow, cases	lb.	.37½–	.40
Potassium bichromate, casks	lb.	.08½–	.08¾
Bromide, gran., bbl.	lb.	.41 –	.48
Carbonate, 80–85%, calcined, casks	lb.	.06 –	.06¼
Chlorate, powd.	lb.	.06½–	.08½
Cyanide, drums	lb.	.47 –	.52
First sorts, cask	lb.	.08½–	.08½
Hydroxide (caustic potash) drums	lb.	.07½–	.07½
Iodide, cases	lb.	3.65 –	3.75
Nitrate, bbl.	lb.	.06 –	.07½
Permanganate, drums	lb.	.14½–	.14¾
Prussiate, red, casks	lb.	.37 –	.38
Prussiate, yellow, casks	lb.	.18 –	.....
Salammoniac, white, gran., casks, imported	lb.	.06 –	.06¼
White, gran., bbl., domestic	lb.	.07 –	.07½
Gray, gran., casks	lb.	.08 –	.09
Salsoda, bbl.	100 lb.	1.20 –	1.40
Salt cake (bulk) works	ton	16.00 –	18.00
Soda ash, light 58% flat, bulk, contract	100 lb.	1.25 –	.....
bags, contract	100 lb.	1.38 –	.....
Dense, bulk, contract, basis 58%	100 lb.	1.35 –	.....
bags, contract	100 lb.	1.45 –	.....
Soda, caustic, 76%, solid, drums contract	100 lb.	3.10 –	.....
Caustic, ground and flake, contracts, dr.	100 lb.	3.50 –	3.85
Caustic, solid, 76% f.a.s. N. Y.	100 lb.	2.90 –	3.05
Sodium acetate, works, bbl.	lb.	.05 –	.05½
Bicarbonate, bulk	100 lb.	1.75 –	.....
Bichromate, casks	lb.	.06½–	.06¾
Bisulphate (niter cake)	ton	6.00 –	7.00
Bisulphite, powd., U.S.P., bbl.	lb.	.04½–	.04½
Bromide, bbl.	lb.	.42 –	.47
Chlorate, kegs	lb.	.06½–	.06¾
Chloride	long ton	12.00 –	13.00
Cyanide, cases	lb.	.19 –	.22
Flouride, bbl.	lb.	.08¾–	.09
Hyposulphite, bbl.	lb.	.02¾–	.02½
Nitrite, casks	lb.	.09 –	.09¾
Peroxide, powd., cases	lb.	.23 –	.27
Phosphate, dibasic, bbl.	lb.	.03½–	.03¾
Prussiate, yel. bbl.	lb.	.10 –	.10½
Salicylate, drums	lb.	$0.38 –	$0.40
Silicate (40°, drums)	100 lb.	.75 –	1.16
Silicate (60°, drums)	100 lb.	1.75 –	2.00
Sulphide, fused, 60-62%, drums	lb.	.02¾–	.03¼
Sulphite, crys., bbl.	lb.	.03¼–	.03½
Strontium nitrate, powd., bbl	lb.	.09½–	.10
Sulphur chloride, yel drums	lb.	.04½–	.05
Crude	ton	18.00 –	20.00
At mine, bulk	ton	16.00 –	18.00
Flour, bag	100 lb.	2.25 –	2.35
Dioxide, liquid, cyl.	lb.	.08 –	.08½
Tin bichloride, bbl.	lb.	.16½–	.....
Oxide, bbl.	lb.	.61 –	.....
Crystals, bbl.	lb.	.40½–	.....
Zinc carbonate, bags	lb.	.12 –	.14
Chloride, gran., bags	lb.	.06 –	.07½
Cyanide, drums	lb.	.40 –	.41
Dust bbl.	lb.	.08 –	.08½
Oxide, lead free, bags	lb.	.07½–	.....
5% lead sulphate bags	lb.	.06½–	.....
French, red seal, bags	lb.	.09½–	.....
French, green seal, bags	lb.	.10½–	.....
French, white seal, bbl.	lb.	.11½–	.....
Sulphate, bbl.	100 lb.	3.50 –	3.75

Coal-Tar Products

Alpha-naphthol, crude, bbl.	lb.	$0.60 –	$0.62
Alpha-naphthol, ref., bbl.	lb.	.75 –	.80
Alpha-naphthylamine, bbl.	lb.	.35 –	.36
Aniline oil, drums	lb.	.16 –	.16½
Aniline salt, bbl.	lb.	.22 –	.23
Anthracene, 80%, drums	lb.	.65 –	.70
Anthraquinone, 25%, drums.	lb.	.65 –	.67
Benzaldehyde U.S.P., tech., drums	lb.	.69 –	.71
Benzene, pure, tanks, works.	gal.	.25 –	.....
Benzene, 90%, tanks, works.	gal.	.23 –	.....
Benzidine base, bbl.	lb.	.78 –	.80
Benzyl chloride, ref. carboys.	lb.	.35 –	.....
Benzyl chloride, tech., drums.	lb.	.25 –	.....
Beta-naphthol, tech., bbl.	lb.	.24 –	.25
Beta-naphthylamine, tech.	lb.	.65 –	.70
Cresylic acid, 97%, drums	gal.	.59 –	.62
95-97%, drums, works	gal.	.55 –	.57
Dichlorbenzene, drums	lb.	.07 –	.08½
Dinitrobenzene, bbl.	lb.	.15 –	.17½
Dinitrochlorbenzene, bbl.	lb.	.20 –	.21
Dinitrophenol, bbl.	lb.	.35 –	.40
Dinitrotoluen, bbl.	lb.	.18 –	.20
Dip oil, 25%, drums	gal.	.26 –	.28
H-acid, bbl.	lb.	.70 –	.74
Meta-phenylenediamine, bbl.	lb.	.90 –	.95
Monochlorbenzene, drums	lb.	.08½–	.10
Naphthalene, flake, bbl.	lb.	.05 –	.05½
Naphthionate of soda, bbl.	lb.	.60 –	.65
Naphthionic acid, crude, bbl.	lb.	.60 –	.62
Nitrobenzene, drums	lb.	.09 –	.09½
Nitro-naphthalene, bbl.	lb.	.25 –	.27
Nitro-toluene, drums	lb.	.13½–	.14
N-W acid, bbl.	lb.	1.10 –	1.15
Ortho-amidophenol, kegs	lb.	2.40 –	2.50
Ortho-dichlorbenzene, drums	lb.	.10 –	.11
Ortho-toluidine, bbl.	lb.	.17 –	.18
Para-aminophenol, base, kegs	lb.	1.15 –	1.20
Para-dichlorbenzene, bbl.	lb.	.17 –	.20
Para-nitraniline, bbl.	lb.	.65 –	.67
Para-nitrotoluene, bbl.	lb.	.40 –	.42
Para-phenylendiamine, bbl.	lb.	1.25 –	1.35
Para-toluidine, bbl.	lb.	.70 –	.75
Phenol, U.S.P., dr.	lb.	.23 –	.25
Picric acid, bbl.	lb.	.20 –	.22
Pitch, tanks, works	ton	27.00 –	30.00
Pyridine, imp., drums	gal.	4.00 –	4.10
Resorcinol, tech., kegs	lb.	1.30 –	1.40
Resorcinol, pure, kegs	lb.	2.00 –	2.25
R-salt, bbl.	lb.	.50 –	.55
Salicylic acid, tech., bbl.	lb.	.32 –	.33
Salicylic acid, U.S.P., bbl.	lb.	.35 –	.....
Solvent naphtha, water-white, tanks	gal.	.24 –	.25
Crude, tanks	gal.	.21 –	.22
Sulphanilic acid, crude, bbl.	lb.	.16 –	.18
Tolidine, bbl.	lb.	1.00 –	1.05
Toluidine, mixed, kegs	lb.	.30 –	.35
Toluene, tank cars, works	gal.	.26 –	.....
Toluene, drums, works	gal.	.31 –	.....
Xylidine, drums	lb.	.40 –	.42
Xylene, 5 deg.-tanks	gal.	.36 –	.40
Xylene, com., tanks	gal.	.24 –	.26

Naval Stores

Rosin B-D, bbl.	280 lb.	$8.00 –	$8.10
Rosin E-I, bbl.	280 lb.	8.10 –	8.20
Rosin K-N, bbl.	280 lb.	8.30 –	8.40
Rosin W.G.-W.W., bbl.	280 lb.	9.50 –	10.25
Turpentine, spirits of, bbl.	gal.	.93 –	.93½
Wood, steam dist., bbl.	gal.	.79 –	.81
Wood, dest. dist., bbl.	gal.	.72 –	.73
Pine tar pitch, bbl.	200 lb.	5.50 –	.....
Tar, kiln burned, bbl.	500 lb.	12.00 –	12.50
Rosin oil, first run, bbl.	gal.	.45 –	.....
Pine tar oil, com'l.	gal.	.30 –	.....

Animal Oils and Fats

Degras, bbl.	lb.	$0.03½ –	$0.05½
Grease, yellow, loose	lb.	.09½ –	.....
Lard oil, Extra No. 1, bbl.	gal.	.96 –	.98½
Lard compound, bbl.	lb.	.13½ –	.14
Neatsfootoil, 20 deg. bbl.	gal.	1.35 –	1.37
Oleo Stearine		.11½ –	.....
Oleo oil, No. 1, bbl.	lb.	.15½ –	.16
Red oil, distilled, d.p. bbl.	lb.	.11 –	.11½
Tallow, extra, loose works	lb.	.10 –	.10½
Tallow oil, acidless, bbl.	gal.	.92 –	.94

Vegetable Oils

Castor oil, No. 3, bbl.	lb.	$0.17 –	$0.17½
Castor oil, No. 1, bbl.	lb.	.17½ –	.17¾
Chinawood oil, bbl.	lb.	.15½ –	.15¾
Coconut oil, Ceylon, bbl.	lb.	.11½ –	.11¾
Ceylon, tanks, N. Y.	lb.	.10¾ –	.....
Corn oil, crude, bbl.	lb.	.12½ –	.....
Crude, tanks, (f.o.b. mill)	lb.	.10½ –	.....
Cottonseed oil, crude (f.o.b. mill), tanks	lb.	.09½ –	.09¾
Summer yellow, bbl.	lb.	.11½ –	.11¾
Linseed oil, raw, car lots, bbl.	gal.	1.15 –	.....
Raw, tank cars (dom.)	gal.	1.09 –	.....
Boiled, cars, bbl. (dom.)	gal.	1.17 –	.....
Olive oil, denatured, bbl.	gal.	1.18 –	1.22
Sulphur, (foots) bbl.	lb.	.09½ –	.09¾
Palm, Lagos, casks	lb.	.09½ –	.....
Niger, casks	lb.	.09 –	.....
Palm kernel, bbl.	lb.	.10½ –	.10¾
Peanut oil, crude, tanks (mill)	lb.	.11½ –	.11¾
Refined, bbl.	lb.	.16 –	.16½
Perilla, bbl.	lb.	.14½ –	.14¾
Rapeseed oil, refined, bbl.	gal.	.96½ –	.97
Sesame, bbl.	lb.	.15 –	.15½
Soya bean (Manchurian), bbl	lb.	.13 –	.....
Tank, f.o.b. Pacific Coast	lb.	.11½ –	.11¾

Fish Oils

Cod, Newfoundland, bbl.	gal.	$0.64 –	$0.66
Menhaden, light pressed, bbl.	gal.	.70 –	.72
White bleached, bbl.	gal.	.72 –	.74
Crude, tanks (f.o.b. factory)	gal.	.55 –	.....
Whale No. 1 crude, tanks, coast	lb.	..... –	.....
Winter, natural, bbl.	gal.	.75 –	.76
Winter, bleached, bbl.	gal.	.78 –	.....

Dye & Tanning Materials

Albumen, blood, bbl.	lb.	$0.50 –	$0.55
Albumen, egg, tech, kegs	lb.	.90 –	.95
Cochineal, bags	lb.	.33 –	.35
Cutch, Borneo, bales	lb.	.04½ –	.05
Rangoon, bales	lb.	.13 –	.13½
Dextrine, corn, bags 100	lb.	4.67 –	4.87
Gum, bags 100	lb.	4.94 –	5.07
Divi-divi, bags	ton	42.00 –	43.00
Fustic, sticks	ton	30.00 –	35.00
Chips, bags	lb.	.04 –	.05
Gambier com., bags	lb.	.20 –	.....
Logwood, sticks	ton	25.00 –	26.00
Chips, bags	lb.	.02½ –	.03
Sumac, leaves, Sicily, bags	ton	165.00 –	175.00
Domestic, bags	ton	50.00 –	55.00
Starch, corn, bags 100	lb.	4.02 –	4.29

Extracts

Archil, conc., bbl.	lb.	$0.16 –	$0.19
Chestnut, 25% tannin, tanks	lb.	.01½ –	.02½
Divi-divi, 25% tannin, bbl.	lb.	.05 –	.05
Fustic, liquid, 42°, bbl.	lb.	.08 –	.09½
Gambier, liq., 25% tannin, bbl.	lb.	.13½ –	.14
Hematine crys., bbl.	lb.	.14 –	.18
Hemlock, 25% tannin, bbl.	lb.	.03½ –	.04
Hypernic, liquid, 51°, bbl.	lb.	.12 –	.13
Logwood, crys., bbl.	lb.	.14 –	.15
Liq., 51°, bbl.	lb.	.07½ –	.08½
Osage Orange, 51°, liquid, bbl.	lb.	.07 –	.08
Quebracho, solid, 65% tannin, bbl.	lb.	.04½ –	.04¾
Sumac, dom., 51°, bbl.	lb.	.06½ –	.06¾

Dry Colors

Blacks–Carbongas, bags, f.o.b. works, contract	lb.	$0.06 –	$0.08
spot, bags	lb.	.08 –	.12
Lampblack, bbl.	lb.	.12 –	.40
Mineral, bulk	ton	35.00 –	45.00
Blues–Prussian, bbl.	lb.	.35 –	.37
Ultramarine, bbl.	lb.	.08 –	.35
Browns, Sienna, Ital., bbl.	lb.	.05 –	.12
Sienna, Domestic, bbl.	lb.	.03 –	.03½
Umber, Turkey, bbl.	lb.	.04 –	.04½
Greens-Chrome, C.P.Light, bbl.	lb.	.30 –	.32
Chrome, commercial, bbl.	lb.	.11 –	.12
Paris, bulk	lb.	.24 –	.26
Reds, Carmine No. 40, tins	lb.	4.25 –	4.50
Iron oxide red, casks	lb.	.08 –	.12
Para toner, kegs	lb.	.95 –	1.00
Vermilion, English, bbl.	lb.	1.45 –	1.50
Yellow, Chrome, C.P. bbls.	lb.	.20 –	.22
Ocher, French, casks	lb.	.02 –	.03

Waxes

Beeswax, crude, Afr. bg.	lb.	$0.34 –	$0.35
Refined, light, bags	lb.	38 –	.39
Candellila, bags	lb.	.32 –	.33
Carnauba, No. 1, bags	lb.	.36 –	.37
No. 2, North Country, bags	lb.	.29 –	.29½
No. 3, North Country, bags	lb.	.24 –	.25
Japan, cases	lb.	$0.16 –	$0.16½
Montan, crude, bags	lb.	.06 –	.06½
Paraffine, crude, match, 105-110 m.p., bbl.	lb.	.06 –	.06½
Crude, scale 124-126 m.p. bags	lb.	.05½ –	.05¾
Ref., 118-120 m.p. bags	lb.	.05¾ –	.06
Ref., 123-125 m.p., bags	lb.	.06 –	.06½
Stearic acid, sgle. pressed, bags	lb.	.12½ –	.13
Double pressed, bags	lb.	.13½ –	.14

Fertilizers

Acid phosphate, 16%, wks.	ton	$7.50 –	$7.75
Ammonium sulphate, bulk f.o.b. works 100	lb.	2.75 –	.....
Blood, dried, bulk	unit	3.85 –	3.95
Bone, raw, 3 and 50, ground	ton	26.00 –	28.00
Fish scrap, dom., dried, wks.	unit	5.00 –	.....
Nitrate of soda, bags 100	lb.	2.50 –	2.53
Tankage, high grade, f.o.b. Chicago	unit	3.10 –	3.20
Phosphate rock, f.o.b. mines Florida pebble, 68-72%	ton	3.00 –	3.50
Tennessee, 75%	ton	6.50 –	6.75
Potassium muriate, 80%, bags	ton	34.55 –	.....
Sulphate, bags, 90%	ton	45.85 –	.....
Double manure salt, bgs.	ton	26.35 –	.....
Kainit, 14%, bgs	ton	10.25 –	.....

Crude Rubber

Para—Upriver fine	lb.	$0.35½ –	$0.36
Upriver coarse	lb.	.27 –	.27½
Plantation—First latex crepe	lb.	.39¾ –	.....
Ribbed smoked sheets	lb.	.39¾ –	.....

Gums

Copal, Congo, amber, bags	lb.	$0.08 –	$0.10
East Indian, bold, bags	lb.	.13 –	.14
Manila, amber, bags	lb.	.14 –	.16
Damar, Batavia, cases	lb.	.28 –	.28½
Singapore, No. 1, cases	lb.	.30 –	.31
Singapore, No. 2, cases	lb.	.21 –	.21½
Kauri, No. 1, cases	lb.	.58 –	.64
Ordinary chips, cases	lb.	.21 –	.22
Manjak, Barbados, bags	lb.	.06 –	.12

Shellac

Shellac, orange fine, bags	lb.	$0.65 –	$0.66
Orange superfine, bags	lb.	.67 –	.68
Bleached, bonedry	lb.	.73 –	.74
T. N., bags	lb.	.62 –	.63

Miscellaneous Materials

Asbestos, crude No. 1 f.o.b., Quebec	sh. ton	$300.00 –	$350.00
Shingle, f.o.b., Quebec	sh. ton	45.00 –	50.00
Cement, f.o.b., Quebec	sh. ton	15.00 –	20.00
Barytes, grd., white, f.o.b. mills, bbl.	net ton	17.00 –	17.50
Grd., off-color, f.o.b., Balt	net ton	13.00 –	14.00
Floated, f.o.b., St. Louis, bbl.	net ton	23.00 –	24.00
Crude f.o.b. mines, bulk	net ton	8.50 –	9.00
Casein, bbl., tech	lb	.11 –	.12
China clay (kaolin) crude, No. 1, f.o.b. Ga	net ton	6.50 –	8.00
Powd., f.o.b. Ga	net ton	12.00 –	16.00
Crude, f.o.b. Va	net ton	5.50 –	7.00
Ground, f.o.b. Va	net ton	10.00 –	20.00
Imp., powd	net ton	45.00 –	50.00
Feldspar, No. 1 f.o.b. N.C.	long ton	6.50 –	7.25
No. 2 f.o.b. N.C.	long ton	4.50 –	5.00
No. 1 gr'd. Me.	long ton	19.00 –	20.00
No. 1 Can., f.o.b., mill, powd	long ton	25.00 –	.....
Graphite, Ceylon, lump, first quality, bbl.	lb.	.05½ –	.06
High grade amorphous crude	ton	15.00 –	35.00
Gum arabic, amber, sorts, bags	lb.	.12 –	.12½
Tragacanth, sorts, bags	lb.	.50 –	.55
No. 1, bags	lb.	1.15 –	1.20
Kieselguhr, f.o.b. Cal.	ton	40.00 –	42.00
F.o.b. N.Y.	ton	50.00 –	55.00
Magnesite, calcined	ton	35.00 –	42.50
Pumice stone, imp., casks	lb.	.03 –	.40
Dom., lump, bbl.	lb.	.06 –	.08
Dom., ground, bbl.	lb.	.03 –	.05
Silica, glass sand, f.o.b. Ind.	ton	2.00 –	2.25
Sand blast, f.o.b. Ind.	ton	2.25 –	3.50
Amorphous, 200-mesh, f.o.b. Ill.	ton	20.00 –	.....
Glass sand, f.o.b. Ill.	ton	2.00 –	2.25
Soapstone, coarse, f.o.b., Vt., bags	ton	7.00 –	7.50
Talc. 200 mesh, f.o.b., Vt., bags, extra	ton	10.50 –	.....
200 mesh, f.o.b., Ga	ton	8.50 –	10.00
325 mesh, f.o.b. New York, grade A	ton	14.75 –	.....

Mineral Oils

Crude, at Wells

Pennsylvania	bbl.	$3.00 –	$3.10
Corning	bbl.	1.75 –	.....
Cabell	bbl.	1.70 –	.....
Somerset	bbl.	1.80 –	.....
Illinois	bbl.	1.37 –	.....
Indiana	bbl.	1.38 –	.....
Kansas and Okla. under 28 deg.	bbl.	.75 –	.85
California, 35 deg. and up	bbl.	.40 –	.....

Gasoline, Etc.

Motor gasoline steel bbls.	gal.	$0.15 –	.....
Naphtha, V. M. & P. deod, steel bbls.	gal.	.14½ –	.....
Kerosene, ref. tank wagon	gal.	.13 –	.....
Bulk, W.W. delivered, N.Y.	gal.	.08½ –	.....
Lubricating oils:			
Cylinder, Penn., filtered	gal.	.34 –	$0.35
Bloomless, 30@31 grav	gal.	.24 –	.....
Paraffin, pale 885 vis	gal.	.16½ –	.17
Spindle, 200, pale	gal.	.25 –	.26
Petrolatum, amber, bbls.	lb.	.04 –	.04½
Paraffine wax (see waxes)			

Refractories

Bauxite brick, 56% Al_2O_3, f.o.b. Pittsburgh	1,000	$140–$145
Chrome brick, f.o.b. Eastern shipping points	ton	45-47
Chrome cement, 40-50% Cr_2O_3	ton	23-27
40-45% Cr_2O_3, sacks, f.o.b. Eastern shipping points	ton	23.00
Fireclay brick, 1st. quality, 9-in. shapes, f.o.b. Ky. wks.	1,000	40-43
2nd. quality, 9-in. shapes, f.o.b. wks.	1,000	33-37
Magnesite brick, 9-in. straight (f.o.b. wks)	ton	65-68
9-in. arches, wedges and keys	ton	80-85
Silica brick, 9-in. sizes, f.o.b. Chicago district	1,000	48-50
9-in. sizes, f.o.b., Birmingham.	1,000	48-50
F.o.b. Mt. Union, Pa.	1,000	33-35
Silicon carbide refract brick, 9-in.	1,000	1,180.00

Ferro-Alloys

Ferrotitanium, 15-18% f.o.b. Niagara Falls,	ton	$200.00 –	.....
Ferrochromium, per lb. of Cr, 1-2% C	lb.	.30 –	.....
4-6% C	lb.	.10½ –	.11
Ferromanganese, 78-82% Mn, Atlantic seabd. duty paid	gr. ton	110.00 –	.....
Spiegeleisen, 19-21% Mn.	gr. ton	32.00 –	33.00
Ferromolybdenum, 50-60% Mo, per lb. Mo.	lb.	1.80 –	2.00
Ferrosilicon, 10-12%	gr. ton	39.50 –	43.50
50%	gr. ton	72.00 –	75.00
Ferrotungsten, 70-80% per lb. of W	lb.	.85 –	.90
Ferro-uranium, 35-50%, of U, per lb. of U	lb.	4.50 –	.....
Ferrovanadium, 30-40%, per lb. of V	lb.	3.25 –	4.00

Ores and Mineral Products

Bauxite, dom. crushed, dried, f.o.b. shipping points	ton	$5.50 –	$8.75
Chrome ore, Calif. concentrates, 50% min. Cr_2O_3	ton	22.00 –	.....
C.i.f. Atlantic seaboard	ton	18.50 –	24.00
Coke, fdry., f.o.b. ovens	ton	5.00 –	5.50
Coke, furnace, f.o.b. ovens	ton	4.25 –	4.50
Fluorspar, gravel, f.o.b. mines, Illinois	ton	17.50 –	18.50
Ilmenite, 52% TiO_2 Va.	lb.	.01½ –	.....
Manganese ore, 50% Mn, c.i.f. Atlantic seaport	unit	.39 –	.41
Manganese ore, chemical (MnO_2)	ton	75.00 –	80.00
Molybdenite 85% MoS_2, per lb. Mo S_2, N. Y.	lb.	.65 –	.75
Monazite, per unit of ThO_2, c.i.f., Atl. seaport	lb.	.06 –	.08
Pyrites, Span., fines, c.i.f. Atl. seaport	unit	.11½ –	.12
Pyrites, Span., furnace size, c.i.f. Atl. seaport	unit	.12 –	.....
Pyrites, dom. fines, f.o.b. mines, Ga.	unit	.12 –	.....
Rutile, 94@96% TiO_2	lb.	.12 –	.15
Tungsten ore, scheelite, 60% WO_3 and over	unit	9.50 –	9.75
Tungsten, wolframite, white, 60% WO_3	unit	9.00 –	9.10
Uranium ore (carnotite) per lb. of U_3O_8	lb.	3.50 –	3.75
Uranium oxide, 96% per lb. U_3O_8	lb.	12.25 –	12.50
Vanadium pentoxide, 76%	lb.	3.00 –	3.25
Vanadium ore, per lb. V_2O_5	lb.	1.00 –	1.25
Zircon, 99%	lb.	.06 –	.07

Non-Ferrous Metals

Copper, electrolytic	lb.	$0.14⅞ – $0.15
Aluminum, 98 to 99%	lb.	.27 – .28
Antimony, wholesale, Chinese and Japanese	lb.	.17¾ – .18
Nickel, 99%	lb.	.31 – 32
Monel metal	lb.	.32
Tin, 5-ton lots, Straits	lb.	.59⅜
Lead, New York, spot	lb.	.10
Zinc, spot, New York	lb.	.0815
Silver (commercial)	oz.	.67⅞
Cadmium	lb.	.60– .62
Bismuth (508 lb. lots.)	lb	1.25–1 30
Cobalt	lb.	2.50–3.00
Magnesium, ingots, 99%	lb.	.90–95
Platinum, refined	oz.	117 00
Mercury 75	lb.	78.00–80.00
Tungsten powder	lb.	.95–1 00

Industrial Developments of the Week

New Construction and Machinery Requirements in the Process Industries

Some Opportunities This Week

Candy	St. Louis, Mo.
Chemicals	Indianapolis, Ind.
Chemicals	Owens Lake, Calif.
Chemistry	Atlanta, Ga.
Clay products	Parkersburg, W. Va.
Glass	Hamilton, Ont.
Leather	Philadelphia, Pa.
Lime, etc.	Birmingham, Ala.
Oil	Toronto, Ont.
Oil refinery	Tillsonbury, Ont.
Paper	Ft. William, Ont.
Pottery	Portland, Ore.
Sugar	Newark, N. J.
Tannery	Newark, N. J.

This page is of value not only as a machinery market but also as an index of the general activity and growth of the industries served by Chem. & Met. The reports are gathered by our regular correspondents who are instructed to verify every detail. Requirements for new machinery will be published here free of charge.

Middle Atlantic

N. J., Newark—The Auto Strop Safety Razor Co., 656 1st Ave., New York City, New York, has work under way on a 3 story factory to be used as a tannery for the preparation and manufacture of strops. Thompson & Binger, Inc., are architects and builders.

N. J., Newark—Newark Sugar Refining Co., A. Segal, Phila., Pa., has acquired a site at Port Newark for the construction of a sugar refinery, estimated cost $5,000,000.

N. Y., Poughkeepsie—Vassar College has awarded the contract for the construction of a laboratory to E. Van Anderson, Market St. Estimated cost $200,000.

Pa., Brockwayville — Bradford Brick & Tile Co., Bradford, is having preliminary plans prepared for the construction of various buildings for brick and tile plant, estimated to cost $2,000,000. D. B. Hendryx, c/o owner, is engineer.

Pa., Philadelphia—E. Hubschman & Sons, Inc., Oriana and Willow Sts., awarded the contract for the construction of a 1 and 4 story, 112x162 ft., with a 4 story, 20x21 ft., wing, leather factory, to Monoghan & Lasse, 3016 Chestnut St.

Pa., Winburne—Highland Brick & Tile Co., has awarded the contract for the construction of a 1 story, 34x76-40x40-32x80 ft. additions to brick and tile plant to E. A. Hess, Winburne. Estimated cost $50,000.

South

Ala., Birmingham — The Alabama Lime and Stone Corporation, has purchased the O'Neal Lime Works at Calera, and will build a plant for the manufacture of lime and by-products. The contract for the construction had been awarded to Schaffer Engineering Co., House Bldg., Pittsburgh, Pa. Estimated cost $800,000. J. H. Adams is president.

Ga., Atlanta—The School of Technology, M. L. Brittam, West North Ave., Pres., awarded the contract for the construction of a chemistry building to C. H. Van Ormer, Herald Bldg., Augusta. $150,000.

Tenn., Kingsport—Tennessee Eastman Corporation plans 80 x 180 ft. addition to plant to be used for wood carbonizing. Additional equipment to be installed.

W. Va., Charleston—Company organized by T. T. Pierce, C. R. Smith, 307 Hunt Ave., J. T. Enright and others plan the establishment of a plant; will equip for nickel, gold, silver and copper plating of metals.

W. Va., Parkersburg—Parkersburg Clay Products Co., G. L. Dudley, Pres., awarded the contract for the construction of buildings and installing continuous tunnel kiln, 350 ft. long to C. B. Harrop, 1794 Coventry St., Columbus, Ohio.

Middle West

Ill., Rockford—Rockford Paper Box Board Co., Catherine St., awarded the contract for the construction of a 3 story, 70 x 100 ft. addition to factory on Sayre St. to Holm-Pake Co., Kishwaukee St. Estimated cost $75,000.

Ind., Indianapolis—Eli Lilly & Co., 210 East McCarthy St., will soon award contracts for the construction of a 6 story chemical factory, estimated cost $800,000. R. Frost Daggett, Consolidated Bldg., is architect.

Mich., Ann Arbor—University of Michigan, S. W. Smith, Secy., University Hall, is having sketches made for the construction of a 3 story laboratory (Simpson Memorial), estimated cost $200,000. A. Kahn, Inc., 1000 Marquette Bldg., Detroit, is architect.

Mich., Calumet—The United Chemical Products Co., manufacturers of fertilizer, glue, etc., plans to rebuild portion of its factory recently destroyed by fire, loss estimated at $350,000, including machinery.

Wis., Madison — Savidusky Dye House, 301 State St., awarded the contract for the construction of a 2 story, 50x185 ft. dye house to Morgan & Morgan, Monroe St.

West of Mississippi

Mo., St. Louis—Mavrakes Candy Co., 4949 Delmar Blvd., is having preliminary plans prepared for the construction of a 3 story, 100x169 ft., candy factory at Delmar Blvd., near Walton St. Estimated cost $150,000.

Tex., Big Lake—Big Lake Oil Co., L. Smith, Pres., plans the construction of a skimming plant for gasoline, kerosene, naptha and fuel oil, capacity 3,000 bbl. daily, estimated to cost $150,000. Private plans. Skimming machinery will be required.

Tex., Kerens—Kerens Cotton Oil Mill Co., plans to rebuild plant, recently destroyed by fire at a loss of $15,000.

Far West

Calif., Owens Lake—Inyo Chemical Co., 605 Market St., San Francisco, is having plans prepared for extensive additions to the alkaloid products manufacturing plant.

Ore., Portland — Pacific Stoneware Co., has had plans prepared for the construction of a 100x170 ft., factory for the manufacture of pottery and stone ware at St. Helens Rd. Rasmussen-Grace Co., Chamber of Commerce Bldg., is architect.

Ore., St. Helens—The St. Helens Pulp & Paper Co., has increased its capital stock to $2,500,000, the proceeds of which will be used to build a pulp and paper mill with a daily capacity of 100 tons of kraft paper. H. F. McCormick is one of the principals.

Canada

Ont., Fort William—Great Lakes Paper Co., A. H. Black, Pres., plans the construction of a newsprint paper mill 200 tons per day capacity, estimated to cost $1,500,000 Private plans. Pulp handling, grinding equipment and paper making machines will be required.

Ont., Hamilton—Dominion Glass Co. has awarded the contract for an addition to plant to W. H. Cooper, Clyde Bldg. Additional special glass manufacturing equipment to be installed. Estimated cost $45,000.

Ont., Tillsonburg—Regal Oil Corporation, 17 Queen St., E, Toronto, W. B. Brooks, Pres., plans the construction of an oil refinery near Tillsonburg on the Dereham-Niddleton town line. Estimated cost $100,000 to $200,000. Storage tanks, refinery equipment, pumps, etc., will be required.

Ont., Toronto—Imperial Oil Ltd., Imperial Oil Bldg., plans the construction of an oil handling and storage plant on Cherry St., estimated to cost $500,000. Private plans. Steel tanks refinery equipment pumps, fillers, etc., will be required.

Unverified

N. Z., Wellington—Preliminary plans are under way for the construction of a fertilizer plant at Wanganui, near here, estimated to cost $1,000,000, with machinery. The American Consulate, Wellington has information regarding the project.

Incorporations

U. S. Dyeing & Cleaning Works, dyeing, Newark, N. J., $125,000. J. M. Steinhardt, Newark.

Mutual Leather & Finishing Co., leather, Newark, N. J., $100,000; J. F. Faughman, Newark.

Franklin Porcelain Co., increase capital from $300,000 to $1,750,000.

G. Sproull Co., Inc., Shreveport, La., paints, etc., capital $100,000; G. W. Sproull, 2529 Greenwood Rd; McEnery, Oliver and others.

Lawson Rubber and Manufacturing Co., Dallas, Tex., capital $25,000, J. R. Lawson, E. R. Lawson and B. H. Abbott, 5219 Richard St.

The Johnson-Fox Co., Pittsfield, Me., mechanical and chemical automobile accessories; $50,000 capital; C. L. Fox, Fairfield.

The Essex Gelatine Co., Boston, gelatine, glue, sandpaper, etc.; $40,000. F. W. Crocker, Malden; F. C. Bassett, Newton; C. W. Benjamin, Watertown.

G. E. March Co., Lynn, Mass., fertilizers, $400,000. H. A. Haugle, Lynn; F. W. Crocker and F. C. Bassett.

The Regal Color & Chemical Co., Providence, R. I., paints and chemicals, 100 shares of stock without par value. J. C. Carman, Providence; E. L. Walling and L. S. Walling.

Siola Rubber Corp., Manhattan, 1,000 shares preferred stock, $100 each; 1,000 ocmmon, no par value. J. G. F. Squires, F. Persh, A. Denner. (Attorneys, Prince & Loeb, 19 Cedar St.)

Riberena Fuel & Chartering Co., Manhattan, petroleum, 100 shares common stock, no par value. J. P. and J. S. Routh. (Attorney, W. B. Devoe, 15 Park Row.)

Coating Products Corp., Manhattan, paints, 500 shares 1st preferred stock, $100 each; 2,000 2nd preferred $10 each; 1,000 common, no par value. E. F. Fisher, C. A. Klots, A. S. Pratt. (Attorneys, Blackman, Pratt & Koehler, 61 Bway.)

Schramm-Farrington Co., Buffalo, paper; $25,000. J. L. Kenefick, C. H. Taylor, M. A. Squire. (Attorneys, Kenefick, Cooke, Mitchell & Bass, Buffalo.)

Robinton Rubber & Chemical Mfg. Corp., Bronx, $12,000. G. B. Robinton, M. Zimmerman, L. Schwab. (Attorney M. Zwerling, 1929 7th Ave.)

American Timber Treating Co., Manhattan, chemicals for lumber, $100,000. E. M. Ross, J. Lowenthal (Attorney, C. McMillan, 111 Bway.)

Sanitas Rubber Products Corp., Manhattan, 750 shares common stock, no par value, H. M. Hart, A. G. Thorne, A. E. Schonberger. (Attorney, L. R. Bachner, 27 Cedar St.